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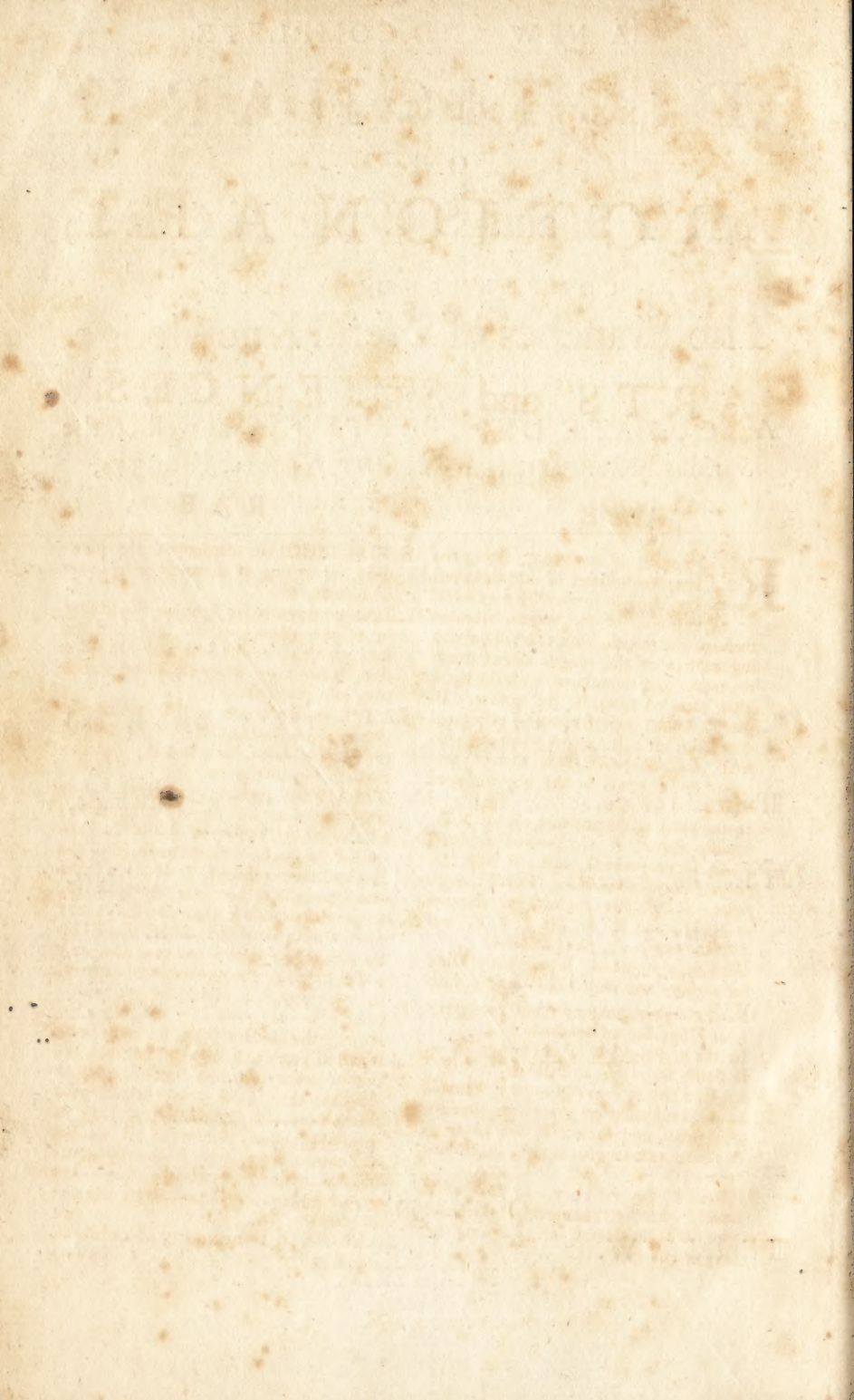
The S E C O N D E D I T I O N ,
With many A D D I T I O N S, C O R R E C T I O N S, and other I M P R O V E M E N T S .

————— *Huc undique Gaza*
Congeritur ————— V I R G .

V O L . I V .

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M D C C L X I V .



A NEW AND COMPLETE

DICTIONARY

O F

ARTS and SCIENCES.

R A B

R, or r, a liquid consonant, being the seventeenth letter of our alphabet. Its sound is formed by a guttural extrusion of the breath, vibrated through the mouth, with a sort of quivering motion of the tongue drawn from the teeth, and cannulated with the tip a little elevated towards the palate. In greek words it is frequently aspirated with an *h* after it, as in *rhapsody*, *rhetoric*, &c. otherwise it is always followed by a vowel at the beginning of words and syllables.

In the notes of the antients, R. or R O. signifies *Roma*; R. C. *Romana civitas*; R. G. C. *rei gerenda causa*; R. F. E. D. *recte factum & dictum*; R. G. F. *regis filius*; R. P. *res publica*, or *Romani principes*; and R. R. R. F. F. F. *res Romana ruet ferro, fame, flamma*.

Used as a numeral, R antiently stood for eighty, and with a dash over it, thus \bar{R} , for eighty thousand; but the greek *r*, or *ρ*, signified an hundred.

In the prescriptions of physicians, R or R stands for *recipe*, i. e. take.

RAAB, a city of lower Hungary, situated at the confluence of the rivers Danube and Raab, and subject to the house of Austria: east longitude 18°, north latitude 48°.

RABATE, in falconry, is said of a hawk, when by the motion of the hand, lure, &c. she leaves off pursuing her prey or quarry.

R A B

RABBETING, in carpentry, the planing, or cutting of channels or grooves in boards, &c.

In ship-carpentry, it signifies the letting in of the planks of the ship into the keel; which, in the rake and run of a ship, is hollowed away, that the planks may join the closer.

RABBI, or **RABBINS**, a title which the pharisees and doctors of the law among the Jews assumed, and literally signifies masters, or excellents.

There were several gradations before they arrived at the dignity of a rabbin, which was not conferred till they had acquired the profoundest knowledge of the law and the traditions. It does not however appear, that there was any fixed age, or previous examination necessary; but when a man had distinguished himself by his skill in the written and oral law, and passed through the subordinate degrees, he was saluted a rabbin by the public voice.

Among the modern Jews, for near seven hundred years past, the learned men retain no other title than that of rabbi, or rabbins: they have great respect paid them, have the first places or seats in their synagogues, determine all matters of controversy, and frequently pronounce upon civil affairs: they have even a power to excommunicate the disobedient.

RABINET, a small piece of ordnance, between

between a falconet and a base. See the article CANNON.

RABBINISTS, among the modern Jews, an appellation given to the doctrine of the rabbins concerning traditions, in opposition to the caraites, who reject all traditions. See the article CARAITES.

RABBIT, *cuniculus*, in zoology, a well known animal of the *lepus*, or hare-kind, with a very short tail.

The rabbit, though a smaller, is a handsomer creature than the hare, but is of various colours even in the same country, its general one in this kingdom being a pale brownish-grey on the back, and white on the belly; however, there are some darker, of a silvery-grey, and altogether white.

There is also a long-tailed species, of the size of our common rabbit, called the siberian rabbit, from its being frequent in Russia and Tartary.

For the method of catching rabbits, by means of ferrets, see FERRET.

RACCOURCY, in heraldry, signifies the same as coupee; that is, cut off or shortened; and denotes a cross, or other ordinary, that does not extend to the edge of the escutcheon, as they always do when absolutely named without such distinction.

RACE, in general, signifies running with others in order to obtain a prize, either on foot, or by riding on horse-back, in chariots, &c.

Racing was one of the exercises among the ancient grecian games, which was performed in a course containing an hundred and twenty five paces; and those who contended in these foot-races were frequently clothed in armour. Chariot and horse races also made a part of these ancient games. See GAMES.

For horse-racing, as practised amongst us, see the article HORSE-RACING.

RACE, in genealogy, a lineage or extraction continued from father to son.

RACHITIS, the-RICKETS, in medicine. See the article RICKETS.

RACILLA, one of the least of the islands of the Archipelago, near the island of Aio, not inhabited.

RACK, in the manege, a pace in which a horse neither trots nor ambles, but shuffles as it were between.

The racking-pace is indeed much the same as the amble, only it is a swifter time and shorter tread.

RACK is also a wooden frame, made to hold hay or fodder for cattle.

RACK, an engine of torture, furnished with pullies and chords, &c. for extorting confession from criminals.

RACK, **ARAC**, or **ARRAC**, in commerce, a spirituous liquor made by the Tartars of Tongusia, who are subject to the czarina of Muscovy. This kind of rack is made of mare's-milk, which is left to be sour, and afterwards distilled twice or thrice between two earthen pots closely stopped, from whence the liquor runs through a small wooden pipe. This liquor is more intoxicating than brandy distilled from wine.

Rack is also a spirituous liquor which the English get from Batavia or Malacca, of which there are three sorts, the one being extracted from the cocoa-tree; the second from rice, and the third from sugar: but the first is the best and most in use. It is made of the blossom-bunch of the cocoa-tree: for which purpose they tie the bunch while it is still wrapped up within its cod, or membrane, with a piece of packthread, and then with a knife make a cross cut in that bunch, a little above the place where it is tied, and adapt a pitcher to it to receive the liquor, which is called toddy, and is vinous, palatable and sweet: others use a bamboo-cane instead of a pitcher. Having thus drawn the liquor, they let it ferment, and afterwards distil it.

Goa and Batavia are the chief places for rack. At Goa there are several kinds; single, double, and treble distilled: but the double distilled, which is that commonly sent abroad, is but a weak spirit when compared with batavia-rack; yet, on account of its peculiar and agreeable flavour, it is preferred to all the other racks of India. The prior rack, made at Madras, the Columbo and Quilone rack, being fiery hot spirits, are but little valued by the Europeans, and therefore seldom imported, though they are highly prized among the natives.

Rack, on being imported, pays a duty of 6 l. 15 s. 6 d. the ton, containing two hundred fifty-two gallons: and a drawback, on exportation, of 6 l. 1 s. 3 d. besides which, it pays for the excise-duty, 4 s. 8 d. the gallon.

To **RACK** wines, &c. to draw them off from their lees, after their having stood long enough to clear and settle.

Hence rack-vintage is frequently used for the second voyage our wine-merchants used to make into France for racked wines.

RACK-

RACKELSBURG, a town of Germany, in the circle of Austria, twenty-three miles south-east of Gratz.

RACKET, a kind of bat to strike the ball with at tennis; usually consisting of a lattice or net-work of cat-gut strained very tight in a circle of wood, with a shaft or handle.

RACKET is also a kind of snow shoe, or machine, which the savages of Canada bind to their feet, to enable them to walk more commodiously on the snow; made much in the manner of a tennis-racket. Its figure is a lozenge, of which the two obtuse angles are turned off. It is bound about with very fine thongs of leather, the meshes of which are much smaller and closer than those of our rackets. In the middle is fitted a kind of shoe lined with wool or hair, to be tied on to the ankle.

RACKOON, *coati*, in zoology, an american quadruped of the shape of a beaver, only somewhat smaller, and with hair like that of a fox; its head too is like that of a fox, only that the ears are shorter, roundish, and naked; its tail is longer than its body, and not unlike that of a cat, with annular streaks of different colours.

RADIÆA, in anatomy, a branch of the brachial artery. See **ARTERY**.

RADIÆUS, or **RADIALIS**. See the article **RADIALIS**.

RADIAL CURVES, are curves of the spiral kind, whose ordinates, if they may be so called, all terminate in the center of the including circle, appearing like radii of that circle, whence the name. See the articles **CURVE** and **SPIRAL**.

RADIALIS, or **RADIÆUS**, in anatomy, the name of two muscles of the arm; one of which, called *radialis internus*, is one of the three flexor muscles of the carpus, or hand, which arising from the internal condyle of the humerus, is inserted into the bone of the carpus next the thumb; and the other, called *radialis externus*, is one of the three extensor muscles of the hand, which arising from the external condyle of the humerus, is inserted into the first metacarpal bone. See **FLEXOR** and **EXTENSOR**.

RADIANT, or **RADIATING POINT**, in optics, is any point of a visible object from whence rays proceed. See the articles **VISION** and **RADIATION**.

RADIANT, or **RAYONANT**, in heraldry. See the article **RAYONANT**.

RADIATED FLOWERS, in botany, are such as have several semi-floccules set

round a disk, in form of a radiant star: those which have no such rays are called discous flowers. See the articles **FLOWER**, **BOTANY**, &c.

The term radiated is also used with respect to one of the antient crowns. See the article **CROWN**.

RADIATION, the act of a body emitting or diffusing rays of light all round, as from a center. See the articles **LIGHT**, **RAY**, &c.

Radiation is considered in optics as three-fold, *viz.* direct, reflected, or refracted. See the articles **VISION**, **REFLECTION**, and **REFRACTION**.

Though every visible body be radiating, yet it need not be luminous in itself, but only illuminated; that is, it may diffuse rays received from a luminous body, as well as emit those of its own.

Some use the term radiation, to denote the motion of the animal spirits; whereas others rather incline to the opinion of their circulation. See the articles **ANIMAL SPIRITS**, **CIRCULATION**, &c.

Plane of **RADIATION**. See **PLANE**.

RADICAL, in general, something that serves as a basis or foundation.

Hence physicians talk much of a radical moisture. See *Radical* **MOISTURE**.

In grammar, we give the appellation radical to primitive words, in contradistinction to compounds and derivatives. See the article **PRIMITIVE**.

Algebraists also speak of the radical sign of quantities, which is the character expressing their roots. See the articles **ROOT** and **CHARACTER**.

RADICATION, a term used by some for the action whereby plants take root, or shoot out roots. See the articles **ROOT** and **VEGETATION**.

RADICLE, that part of the seeds of all plants, which upon vegetating becomes its root, and is discoverable by the microscope. See **VEGETATION**.

RADICOFANI, a town of Tuscany, 42 miles south of Sienna.

RADIOMETER, an instrument otherwise called the fore-staff. See the article **FORE-STAFF**.

RADISH, *raphanus*, in botany, &c. See the article **RAPHANUS**.

RADIUS, in geometry, the semi-diameter of a circle, or a right line drawn from the center to the circumference. See the article **CIRCLE**.

In trigonometry, the radius is termed the whole sine, or sine of 90°. See the article **SINE**.

For the radius of the evolute, of curvature, &c. in the higher geometry, see EVOLUTE, CURVATURE, &c.
Some also call the fore-staff *radius astro-nomicus*. See FORE-STAFF.

RADIUS, in anatomy, the exterior bone of the arm, descending along with the ulna from the elbow to the wrist. See the article SKELETON.

In its upper extremity there is a glenoid cavity for its articulation with the humerus; also a crest, by means of which it is articulated with the ulna: in the lower extremity the head is thicker, and of a more angular figure, with a very large hollow in its middle, for its articulation with the wrist.

RADIX, the same with root. See the article ROOT.

RADNOR, the capital of the county of Radnor in Wales, situated in west long. $3^{\circ} 6'$, north lat. $52^{\circ} 20'$.

RAFFLING, a game with three dice, in which he who throws the greatest pair, or pair royal, in three casts, wins the prize or stake.

The raffle is properly a doublet or triplet: for a raffle of all aces or duces, carries it against mere points.

Raffling is also used when a number of people club for the purchase of a commodity; and he that throws the highest on three dice takes it.

RAFTERS, in building, are pieces of timber, which standing by pairs on the reason or raising piece, meet in an angle at the top, and form the roof of a building.

It is a rule in building that no rafters should stand farther than twelve inches from one another: and as to their sizes or scantlings, it is provided by act of parliament, that principal rafters, from twelve feet six inches to fourteen feet six inches long, be five inches broad at the top and eight at the bottom, and six inches thick. Those from fourteen feet six inches to eighteen feet six inches long, to be nine inches broad at the foot, seven inches at the top, and seven inches thick: and those from eighteen feet six inches, to twenty-one feet six inches long, to be ten inches broad at the foot, eight at the top, and eight thick. Single rafters, eight feet in length, must have four inches and a half, and three inches three quarters in their square. Those of nine feet long must be five and four inches square.

Principal rafters should be nearly as

thick at the bottom as the beam, and should diminish in their length one fifth or one sixth of their breadth; the king-posts should be as thick as the principal rafters, and their breadth, according to the bigness of them that are intended to be let into them, the middle part being left somewhat broader than the thickness.

RAG, or **RAKE**, a company, or herd of young colts.

RAGGED-HAWK, among falconers, is one that has his feathers broken. See the article HAWK.

RAGGED, in heraldry. See **RAGULED**.

RAGOUT, or **RAGOO**, a sauce, or seasoning, intended to rouse the appetite when lost or languishing.

This term is also used for any high seasoned dish prepared of flesh, fish, greens, or the like; by stewing them with bacon, salt, pepper, cloves, and the like ingredients. We have ragouts of celery, of endive, asparagus, cock's-combs, giblets, cray-fish, &c.

The antients had a ragout called garum, made of the putrified guts of a certain fish kept till it dissolved into a mere canies, which was thought such a dainty, that, according to Pliny, its price equalled that of the richest perfumes.

RAGULED, or **RAGGED**, in heraldry, jagged or knotted. This term is applied to a cross formed of the trunks of two trees without their branches, of which they shew only the stumps. See plate CCXXVII. fig. 2.

Raguled differs from indented, in that the latter is regular, the former not.

RAJA, the title of the indian black princes, the remains of those who ruled there before the moguls. Some of the rajas are said to preserve their independency, especially in the mountainous parts; but most of them pay an annual tribute to the mogul. The indians call them *rai*; the Persians *raian*, in the plural; and our travellers *rajas*, or *ragias*.

RAJA, in ichthyology, a genus of the chondropterygious order of fishes, with five apertures of the gills on each side; the head and body are depressed or flat; the sides are terminated with broad fins, which supply the place of pectoral fins in other fishes; the eyes are in the upper part of the head, and behind them is a single foramen; and the tail is usually long and slender.

To this genus belong the thornback, &c.

fire-flaire, sea-eagle, white-horse, skaite, and torpedo or cramp-fish.

RAJAMAHAL, a city of the hither India, situated on the river Ganges, in $86^{\circ} 30'$ east long. and $24^{\circ} 30'$ north lat.

RAJANIA, in botany, a genus of the dioecia hexandria class of plants, without any flower petals; the fruit is roundish, and contains a single seed of the same shape.

RAIL, in architecture, is used in different senses, as for those pieces of timber which lie horizontally between the pannels of wainscot; for those which lie over and under the balusters in balconies, stair-cases, and the like; and also for those pieces of timber which lie horizontally from post to post in fences, either with poles or without.

RAIL, *ortygometra*, in ornithology, a genus of birds of the order of the scolopaces, the beak of which is shorter than the toes: it is of a compressed form, and terminated in a point; but the two chaps are equal in length. It is of the size of the common magpye, and is an elegant bird, of a bright brown colour, variegated with black spots; it is common in rich pastures, where its constant note is *cree, cree*.

RAIN, a watery-meteor, which descends from the clouds in form of drops of water. See **CLOUD**, **METEOR**, &c.

Rain is apparently the precipitated vapours of watery clouds: thus, when various congeries of clouds are driven together by the agitation of the winds, they mix and run into one body, and by that means dissolve and condense each other into their former substance of water; also the coldness of the air is a great means to collect, compact, and condense clouds into water; which being heavier than the air, must of necessity fall through it in the form we call rain. Now the reason why it falls in drops, and not in whole quantities, as it becomes condensed, is the resistance of the air; whereby, being broken and divided into smaller and smaller parts, the farther it passes through the air, it at last arrives to us in small drops.

Mr. Derham accounts for the precipitation hence, that the vesiculæ being full of air, when they meet with a colder air than that they contain, their air is contracted into a less space; and, consequently, the watery shell rendered thicker, so as to become heavier than the air, &c.

Others only allow the cold a part in the action, and bring in the winds as sharers with it: indeed, it is plain, that a wind, blowing against a cloud, will drive its vesiculæ upon one another, by which means several of them coalescing, will be enabled to descend; and the effect will be still more considerable if two opposite winds blow towards the same place. Add to this, that clouds already formed, happening to be aggravated by fresh accessions of vapour continually ascending, may thence be enabled to descend.

According to Rohault, the great cause of rain is the heat of the air, which, after continuing for some time near the earth, is at length carried up on high by a wind, and there thawing the snowy villi, or flocks of the half frozen vesiculæ, reduces them into drops; which, coalescing, descend.

Others, as Dr. Clarke, &c. ascribe this descent of the clouds rather to an alteration of the atmosphere than of the vesiculæ; and suppose it to arise from a diminution of the elastic force of the air. This elasticity, which depends chiefly or wholly on the terrene exhalations, being weakened, the atmosphere sinks under its burden, and the clouds fall.

Now the little vesicles, being once upon the descent, will persist therein, notwithstanding the increase of resistance they every moment meet with. For as they all tend toward the center of the earth, the farther they fall, the more coalitions will they make; and the more coalitions, the more matter will there be under the same surface; the surface only increasing as the squares, but the solidity as the cubes; and the more matter under the same surface, the less resistance there will be to the same matter. Thus, if the cold, wind, &c. set early enough to precipitate the ascending vesicles, before they are arrived at any considerable height, the coalitions being but few, the drops will be proportionably small; and thus is formed a dew. If the vapours be more copious, and rise a little higher, we have a mist or fog. A little higher still, and they produce a small rain, &c. If they neither meet with cold nor wind, they form a heavy, thick, dark sky.

Hence, many of the phenomena of the weather may be accounted for; as, why a cold summer is always a wet one, and a warm, a dry one; Why we have commonly

monly most rain about the equinoxes; Why a settled, thick, close sky, scarce ever rains, till it have been first clear. As to the quantity of rain that falls, its proportion in several places at the same time, and in the same place at several times, we have store of observations, journals, &c. in the Memoirs of the French Academy, Philosophical Transactions, &c.

Preternatural RAINS, as of blood, are very frequent in our annals, and even natural histories; yet, if enquired into, they will be found other things than rain. Those rains, Dr. Merret observes, are nothing more than the excrements of insects, as butterflies, &c. And he adds, that it is very evident the rains of wheat are nothing but ivy-berries swallowed by the starling, and voided again by stool.

RAINS, in the sea-language, all that tract of sea to the northward of the equator, between four and ten degrees latitude, and lying between the meridian of Cape Verde and that of the easternmost islands of the same name.

It is so called from the almost continual calms, constant rains, thunder and lightning found there.

RAIN-BOW, *iris*, in meteorology, a meteor, in form of a party coloured arch, or semi-circle, exhibited in a rainy sky, opposite to the sun, by the refraction of his rays in the drops of falling rain. See the article REFRACTION.

In order to illustrate this phenomenon, suppose BNFG (pl. CCXXVI. fig. 1.) to be a spherical drop of falling rain, and AN a ray of the sun falling upon it in the point N; which ray suppose refracted to F, from thence reflected to G, and there again refracted in the direction GR to the eye of a spectator; and let IG be perpendicular to the drop in the point G; then will the ray or beam of light, by its refraction at G, be separated into several sorts of rays, which will paint their respective colours in that part of the drop; of which that next the perpendicular IG will be red, as being least refracted; and the rest in order above it, *viz.* orange, yellow, green, blue, indigo, violet. Now it is found by computation, that the greatest angle SEO, (*ibid.* fig. 2.) or EOP, because OP parallel to SE, under which the most refrangible rays can come to the eye of the spectator at O, is $40^{\circ} 17'$; and that the great angle FOP, under

which the most refrangible rays come to the eye at O, is $42^{\circ} 2'$; and so all the particles of water, within the difference of of those two angles, EF, will exhibit severally the various colours of the prism, and constitute the interior rainbow in the cloud. See COLOUR.

If the beam of light go not out of the drop, at G, but is reflected a second time, to H; (*ibid.* fig. 1 and 2.) and is there refracted in the direction HS, making the angle SYA with the incident ray AN, it will paint on the part H the several colours of light; but in an inverse order to the former, and more faint, by reason of the rays lost by the second reflection. It has been found also, that the least angle SGO, or GOP, under which the least refrangible rays can come to the eye at O, after two reflections and two refractions, is $50^{\circ} 57'$; and the least angle HOP, under which the most refrangible rays can come to the eye in this case, is $54^{\circ} 7'$; whence all the colours of the exterior rainbow, will be formed in the drops from G to H; which is the breadth of this bow, *viz.* $3^{\circ} 10'$; whereas the breadth of the former, or interior bow, *viz.* EF, is but $1^{\circ} 45'$; and the distance between the bows, *viz.* FG, is $8^{\circ} 55'$. And such would be the measure of the bows, were the sun but a point; but since his body subtends an angle of half a degree, it is evident, by so much will each bow be increased, and their distance diminished.

To apprehend rightly the different affections of the rain-bow, we must attend to the following particulars. 1. That though the rain-bow be occasioned by the refracted and reflected light of the sun falling on the drops of rain, yet neither of them is produced by any rays falling on any part of the drop indifferently, but by those only which fall on the surface of the drop BLQG (*ibid.* fig. 1, 2, 3.) in or about the point N, as the ray AN; those which fall nearer to B, or farther towards L, being unconcerned in this production. 2. The internal bow is produced by two refractions and one reflection. The first refraction is of the incident rays extremely near AN, by which they proceed from N to one common point or focus at F, from whence they are reflected to G, and are there a second time refracted towards R, and produce the various colours of the said bow. 3. There is a necessity that several rays should



should be refracted together to the point F, that being reflected together from thence to G they may there go out parallel, and so come in quantity sufficient to excite the sensation of colours in a strong and lively manner. Now those rays, and those only, which are incident on the globe about the point N, can do this, as will appear from what follows: for, 4. The point F makes the arch QF a *maximum*, or the distance QF from the axis of the drop SQ is greater than any other distance from whence any other rays nearer to the axis, as SD, SE, or farther from it, as SH, SI, are reflected; because those which are nearer after the first refraction tend to points in the axis produced more remote than that to which the ray SN tends; and therefore as their distance from the axis increases, so likewise will the distances of their points of reflection QP, QQ, till the ray becomes SN; after which the rays more remote from the axis, as SH, SI, are refracted towards the points XY, which are nearer and nearer to the axis; and this occasions the points of reflection on the farthest side of the drop to decrease again from F towards Q. 5. Hence it will necessarily happen, that some rays above and below the ray SN will fall upon the same point, as O or P, on the farthest side; and for that reason they will be so reflected from thence as to go out of the drop by refraction parallel to each other. Thus let SE below, and SH above the ray SN, be refracted both to one point O; from hence they will be reflected to M and L, and will there emerge parallel, 'tis true, but alone; being divested of their intermediate rays SN, which going to a different point F will be reflected in a different direction to G, and emerge on one side, and not between those rays, as when they were incident on the drop. All which is evident from the figure. 6. As this will be the case of all the rays which are not indefinitely near to SN, it is plain, that being deprived of the intermediate rays, their density will be so far diminished, as to render them ineffectual for exciting the sensation of colours; and they are therefore called *inefficacious rays*, in contradistinction to those which enter the drop near SN, and which, having the same point F of reflection, are not scattered like the others, but emerge together at G, so as

to constitute a beam GR of the same density with the incident beam SN, and therefore capable of exhibiting a vivid appearance of colours, and for this reason are called *efficacious rays*.

Phænomena of the RAINBOW. The first is, that each is variegated with all the prismatic colours. This is a necessary consequence of the different refrangibility of the rays refracted and reflected in drops of falling rain. Let A (*ibid.* fig. 4.) be such a drop, SN a ray entering it at N, which is refracted to F, from whence refracted to G, where, as it emerges, it is refracted into all the several sorts of rays of which it is composed, *viz.* GR, the least refrangible or red making ray, GO the orange, GY the yellow, GG the green, GB the blue, GI the indigo, and GV the violet, or most refrangible ray.

The truth of this may be easily proved by experiment, by suspending a glass globe filled with water in the sun-shine, and viewing it in such a position, that the rays SN will fall upon it, and emerge to the eye at A, under the several angles from SFR to SFV; which may be easily effected by letting the globe descend from A to G, by a string going over a pulley.

Hence, the second phænomenon, *viz.* the circular form, is accounted for, and also the third, which is the breadth of the bow; for that will be equal to the angle $ARG = RGV = 1^\circ 45'$, where the ray, as here, emerges after one reflection. These particulars are represented more completely in fig. 5. where BGD is the red circumference formed by the rotation of the ray AG, that can first come to the eye at A; and CgE is the violet arch formed by the least refrangible ray gA; after which the rays are all refracted below the eye. And thus, by the intermediate rays and colours, the whole interior bow is produced.

The fourth phænomenon is the appearance of two bows. This follows from hence, that after an efficacious ray of light SN, entering a drop of rain, has been twice reflected on the farthest side at F and H, it will emerge refracted into all its simple or constituent rays at G upon the upper side of the drop, so as to make with the incident ray the angle $GYN = SYA = 54^\circ 10'$, if that ray be the violet sort, or most refrangible;

but if it be of the red or last refrangible sort, then the said angle is but $50^{\circ} 48' = \text{SYA}$.

Therefore, all those drops which are so situated around the eye, that their most refrangible rays shall fall upon it, must with those rays make an angle with the line AP passing through the eye parallel to the sun's rays, *viz.* the angle GAP, equal to the angle SYA, or $\text{GAP} = 54^{\circ} 10'$. These rays, therefore, will every where exhibit a violet colour in the arch PGL. For the same reason, those drops whose least refrangible rays fall upon the eye at A, make the angle $\text{gAP} = 50^{\circ} 58'$; and so the ray Ag, revolving about the axis AQ, will describe the circular arch MgK, which will exhibit the deepest red; and all the drops between G and g will paint the several other coloured peripheries, all which together will complete the exterior bow.

The fifth phenomenon is the greater breadth of the exterior bow. Thus, if from $54^{\circ} 10'$ we subtract $50^{\circ} 58'$, we shall have $3^{\circ} 12' = \text{Gg}$ = the width of the outer bow; which, therefore, is almost twice as wide as the interior bow. The sixth phenomenon is the distance between the two bows, which is thus determined: from the angle which the least refrangible ray in the upper bow makes with the axis AP, *viz.* $50^{\circ} 58'$, subtract the angle $42^{\circ} 2'$, which the most refrangible rays make therewith in the lower bow, and the remainder $8^{\circ} 56' = \text{gAF}$ is the arch of distance between the bows.

The seventh phenomenon is the inverse order of the colours in the two bows. This follows from the contrary parts of the drop on which the ray is incident, and from whence it emerges and is refracted. Thus, because the rays SN enter the upper part of the drop, and emerge from the lower, it is evident the rays refracted in this case (*viz.* in the interior bow) will have a situation quite the reverse of those which enter on the lower part of the drop, and are refracted from the upper, as in the exterior bow, whose colours are violet, indigo, blue, green, yellow, orange, and red; whilst those of the other are red, orange, yellow, green, blue, indigo, and violet; counting from the upper parts downwards in both.

The eighth phenomenon is the faintness of the exterior bow, in comparison of

the interior one. This is the consequence of the rays being twice reflected within the drops which form the outer bow. They who make the experiment in a dark chamber, may wonder when they observe how large a part of the beam (that enters the globule at N) goes out at F, that there should be enough in the remaining part FG to exhibit the colours so strong and vivid in the first bow as they appear; but then, considering how much of this residual ray is refracted at G, it is rather a wonder how the very small part reflected to H, should there, when refracted, be in quantity sufficient to excite any distinct ideas of colours at all.

The ninth phenomenon is, that sometimes more than two bows appear; as in a very black cloud we have observed four, and a faint appearance of a fifth; but this happens rarely. Now, these spurious bows, as we may call them, cannot be formed in the manner as the two principal bows are, that is, by refraction after a third, fourth, fifth, &c. refraction; for the beam is by much too weak to exhibit colours by refraction, even after the third reflection only, much less would it after a fourth or fifth. Besides, though after a third and fourth reflection of the rays they should be supposed capable of shewing their colours, yet the bows made thereby would not appear at the same time with the other two, nor in the same part of the heavens, but in the rain between us and the sun, and must be viewed by the spectator's face turned towards the sun, and not from it, as in the other case.

The tenth phenomenon, is the appearance of the bows in that part of the heavens opposite to the sun. This necessarily happens from the incident and emergent ray being both on one side of the drop; for it is evident, that in order to see the colours, we must look to that part against which the sun shines.

The eleventh phenomenon is, that they never appear but when and where it rains. This is because rain affords a sufficient plenty of drops, or aqueous spherules, proper to reflect and refract the light fit for this purpose, which cannot be done without a requisite size, figure, and disposition of the particles, which the vapour of the cloud does not admit, and therefore clouds alone exhibit no such appearance.

The twelfth phenomenon is the dimon-

sion

son of the bows. This is determined easily; for continuing the axis AP to Q, the center of the bows, we have the semidiameter of each bow in the angle QAG, or QAG; the double of which gives the angles which the whole diameters of the bows subtend, and are therefore the measure of their magnitude. The thirteenth phenomenon is the altitude of the bow above the horizon, or surface of the earth. This is equal to the angle GAT, which may be taken by a quadrant, or it may be known for any time by having given the sun's altitude, which is equal to the angle TAQ; which therefore subtracted from the constant angles QAF, or QAY, will always leave the angle of the apparent height of the bow.

Lunar RAINBOW. The moon sometimes also exhibits the phenomenon of an iris, by the refraction of her rays in drops of rain in the night-time.

Aristotle says, he was the first that ever observed it; and adds, that it is never visible, but at the time of full moon.

The lunar iris has all the colours of the solar, only fainter. See Phil. Transf. n° 331.

Marine RAINBOW, the sea-bow, is a phenomenon sometimes observed in a much agitated sea, when the wind, sweeping part of the tops of the waves, carries them aloft; so that the rays of the sun are refracted, &c. as in a common shower.

F. Bourzes, in Phil. Transf. observes, that there are scarce above two colours distinguishable, a dark yellow on the side next the sun, and a pale green on the opposite side. But there are sometimes twenty or thirty of them seen together. They appear at noon day, and in a position opposite to that of the common bow, the concave side being turned upwards.

There is a kind of white colourless rainbow which Mentzelius and others saw at moon-day. M. Marriote, in his fourth *Essai de Physique*, says, they are formed in mists, as the others are in showers; having observed several of them both after sun-rising and in the night.

The want of colours in these, is owing to the exceeding tenuity of the vesicles of the vapour, which being only little watery pellicles bloated with air, the rays of light undergo but little refraction in passing out of air into them. Hence

the rays are reflected from them compounded, as they come.

Robault mentions coloured rainbows on the grass formed in the morning dew.

RAISER, in building, a board set on edge under the fore side of a step, stair, &c. See the article **STAIR CASE**.

RAISING, in the manege, one of the three actions of a horse's legs, the other two being the stay and the tread.

In caprioles, curvets, &c. the raising or lifting up of his leg is esteemed good, if he perform it hardly and with ease; not crossing his legs, nor carrying his feet too much out or in, yet bending his knees as much as is needful.

RAISING-PIECES, or REASON PIECES, in architecture, are pieces that lie under the beams, and over the posts or puncheons.

RAISINS, grapes prepared by suffering them to remain on the vine till they are perfectly ripe, and then drying them in the sun, or by the heat of an oven. The difference between raisins dried in the sun, and those dried in ovens, is very obvious: the former are sweet and pleasant, but the latter have a latent acidity with the sweetness that renders them much less agreeable.

The common way of drying grapes for raisins, is to tie two or three bunches of them together while yet on the vine, and dip them into a hot lixivium of wood-ashes with a little of the oil of olives in it. This disposes them to shrink and wrinkle, and after this they are left on the vine three or four days separated on sticks in an horizontal situation, and then dried in the sun at leisure, after being cut from the tree. The finest and best raisins are those called in some places Damascus and Jube raisins; which are distinguished from the others by their size and figures: these are flat and wrinkled on the surface, soft and juicy within, and near an inch long, and when fresh and growing on the bunch, are of the size and shape of a large olive.

The raisins of the sun, and jar-raisins, are all dried by the heat of the sun, and these are the sorts used in medicine. However, all the kinds have much the same virtues; they are all nutritive and balsamic; they are allowed to be attenuant, are said to be good in nephritic complaints, and are an ingredient in pectoral decoctions, in which cases, as also in all others where astringency is not required

of them, they should have the stones carefully taken out.

Raisins, on being imported, pay the following duties; large raisins, the hundred weight, 11s. 8 $\frac{17\frac{1}{2}}{100}$ d. and on exportation, draw back, 10s. 11 $\frac{62\frac{1}{2}}{100}$ d. Raisins of the sun, the hundred weight pay, on importation, 14s. 9 $\frac{0}{100}$ d. and on exportation, draw back, 13s. 1 $\frac{1}{2}$ d. Of Lipra or Belvidera, the hundred weight pay, on importation, 7s. 1 $\frac{59\frac{1}{2}}{100}$ d. and on exportation, draw back, 6s. 10 $\frac{46\frac{1}{2}}{100}$ d.

Of Smyrna, either black or red, the hundred weight pay, on importation, 9s. 3 $\frac{4\frac{1}{2}}{100}$ d. and, on exportation, draw back, 8s. 9 $\frac{1}{2}$ d. Of Alicant, Denia, and other raisins, not otherwise rated, the hundred weight pay, on importation, 6s. 10 $\frac{72\frac{1}{2}}{100}$ d. and, on exportation, draw back, 6s. 7 $\frac{87\frac{1}{2}}{100}$ d. More, if in a foreign bottom, for every 20s. value of the above rates, 3s.

RAISIN brandy, a name given by our distillers to a very clear and pure spirit, procured from raisins, fermented only with water. Thus treated, they yield a spirit scarce at all distinguishable from some of the wine-spirits; for there are as many kinds of wine-spirits, as there are of grapes. The coarser the operation of distilling is performed in this case, the nearer will be the resemblance of the wine-spirit; that is, there will be most of this flavour in the spirit, when as much as can be of the oil is thrown up with a galloping heat. Dr. Shaw observes, that the distillers are very fond of the wine-spirit, with which they hide and disguise the taste of their nauseous malt, and other spirits; and in defect of that spirit, this of raisins, made in this coarse manner, will go almost as far. It is indeed surprising how extensive the use of these flavouring spirits is, ten gallons of raisin-spirit, or somewhat less of the wine-spirit, being often sufficient for a whole piece of malt spirit, to take off its native flavour, and give it an agreeable vinosity. It is no wonder therefore, that the distillers and ordinary rectifiers are so fond of this, as it is a good cloak for the defects and imperfection of their processes. When raisin-brandy is intended for common use, the fire should be kept slower

and more regular in the distillation, and the spirit, though it hath less of the high flavour of the grape, will be more pleasant and more pure.

RAITING, or **RATING**, the laying of flax, hemp, timber, &c. when green, in a pond or running water, to season, and prepare it for future uses.

RAKE of a ship is all that part of her hull which hangs over both ends of her keel. That which is before, is called the fore-rake, or rake-forward; and that part which is at the setting on of the stern-post, is called the rake-aft, or afterward.

RAKE of the rudder, is the hindermost part of it.

RAKE, among hunters, the same with rag. See the article **RAG**.

RAKE, in mining, the same with vein. See the article **VEIN**.

RAKEE, in falconry, a term applied to a hawk that flies out too far from the fowl.

RAKING, of an horse, is drawing the ordure with the hand out of the fundament, when he is coltise, and cannot dung; in doing which the hand should be anointed with butter or sallad-oil.

An horse is also said to rake, when being shoulder-splaid, or having strained his fore-quarters, he goes so lame as to drag one of his fore-legs in a semi-circle.

RAKING TABLE, or **RAKED TABLE**, among architects, is a member hollowed in the square of a pedestal, &c. See the article **CAVETTO** and **SCOTIA**.

RALLYING, in war, reassembling or calling together troops broken and put to flight.

RAM, in zoology, the male of the sheep kind. See the article **SHEEP**.

RAM, in astronomy, the same with aries. See the article **ARIES**.

Battering RAM, in antiquity, a military engine used to batter and beat down the walls of places besieged.

The battering ram was of two sorts, the one rude and plain, the other compound. The former seems to have been no more than a great beam which the soldiers bore on their arms and shoulders, and with one end of it by main force assailed the wall. The compound ram is thus described by Josephus: it is a vast beam, like the mast of a ship, strengthened at one end with a head of iron, something resembling that of a ram, whence it took its name. See plate CCXXVII. fig. 1. This was hung by the middle with ropes to another beam, which lay across two posts;

Fig. The Battering RAM.

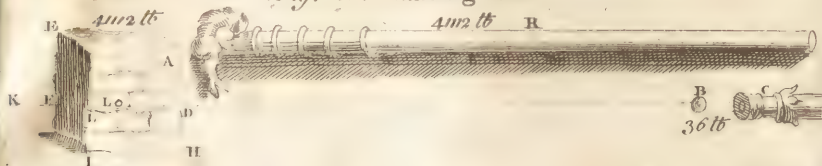


Fig. 4. RANA PISCATRIX.

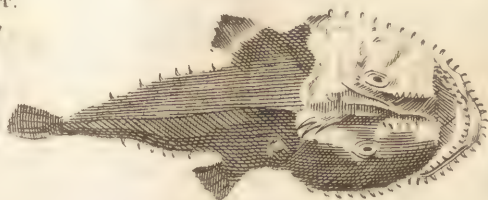


Fig. 2. RAGULED. Fig. 3. RAMPANT.

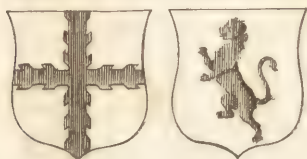


Fig. 5. RANUNCULUS.



Fig. 6. RATS.



W. B. Wood



posits; and hanging thus equally balanced, it was by a great number of men drawn backwards and pushed forwards, striking the wall with its iron-head.

Plutarch informs us, that Mark Anthony, in the Parthian war, made use of a ram fourscore feet long; and Vitruvius tells us, that they were sometimes an hundred and six, and sometimes an hundred and twenty feet in length; and to this perhaps, the force and strength of the engine was in a great measure owing. The ram was managed at one time by a whole century of soldiers, and they being spent, were scolded by another century, so that it played continually without any intermission.

In order to calculate the force of the battering-ram, R, (plate CCXXVII. fig. 1.) suppose it to be 28 inches in diameter, and 180 feet long; and consequently its solid content 750 cubic feet; which, allowing 50 pounds for each foot, will weigh 37500 pounds; and suppose its head of cast-iron, together with three iron hoops, &c. to be 3612 pounds. Now all these weights added together, make 41112 pounds, equal the weight of the whole ram; which will require 1000 men to move it, so as to cause it to strike against the point L of the wall A H I G E, each man moving a weight of 41 pounds. The quantity of motion produced by this action, when the ram moves one foot in a second, may be expressed by the number 41112; which motion or force compared with the quantity of motion in the iron-ball B, shot out of the cannon C, will be found equal to it; for a cannon-ball is known to move as fast as found for about the space of a mile; and if you multiply 36 pounds, the weight of the ball, by 1142, the number of feet which sound moves in one second, you will have the number 41112 for the quantity of motion or force, in the ball B striking at L. And if, after a few strokes given by the battering-ram, the mortar or cement is so loosened, that the piece of the wall A D D F E is at last by a stroke of the ram carried forward from F to K, and so beaten down; the same thing will be performed by a cannon-ball, after an equal number of strokes.

This shews how advantageous the invention of gunpowder is; since we are thereby enabled to give such a prodigious velocity to a small body, that it shall have as great a quantity of motion as a

body immensely greater, and requiring vastly more hands to work it: for three men will manage a cannon, which shall do as much execution as the above battering-ram wrought by 1000. The ram, whose force is here calculated, is taken at a mean; being bigger than some, and less than others, of those used by the ancients.

RAM'S HEAD, in a ship, is a great block belonging to the fore and main-halliards. It has three shivers in it, into which the halliards are put, and in a hole at the end of it are reeved the ties.

RAMADAN, a solemn season of fasting among the mahometans, kept in the ninth month of the arabic year. This fast consists in abstaining from meat and drink, and from lying with their wives each day, from the raising of the sun till the stars appear; and is of such strict obligation, that none is excused from it; for the sick, and all others who cannot observe it in this month, are obliged to fast another entire month instead of it. So superstitious are the mahometans in the observance of this fast, that they dare not wash their mouths, or even swallow their spittle. The men are, indeed, allowed to bathe themselves, on condition they do not plunge the head under water, lest some drops enter by the mouth or ears, &c. but as for the women, they are strictly forbid bathing, for fear of taking in water at the pudendum. However, they frequently feast all night. The mahometans call this month holy, and believe, that as long as it lasts, the gates of paradise are open, and those of hell shut.

RAMAGE, the boughs or branches of trees.

RAMAGE-FALCON, or **HAWK**, one that is wild and coy, as having been long among the boughs preying for itself. All falcons retain this name when they have left the aery; being so called in May, June, July and August. These are very rarely reclaimed.

RAMAGE-VELVET. See **VELVET**.

RAMBERVILLERS, a city of Germany, in the dutchy of Lorrain: east long. 6° 30', north lat. 48° 20'.

RAMEKINS, a fortress of Zealand, one of the United Provinces, situated five miles south of Middleburg.

RAMERA, a town of France, in the province of Champain, eighteen miles north-east of Troyes.

RAMIFICATION, the production of boughs

boughs or branches, or of figures resembling branches.

RAMILLIES, a small town in the Austrian Netherlands, in the province of Brabant, ten miles north of Namur.

RAMMER, an instrument used for driving down stones or piles into the ground; or for beating the earth, in order to render it more solid for a foundation.

RAMMER of a gun, the gun-stick; a rod used in charging of a gun, to drive home the powder, as also the shot and the wad, which keeps the shot from rolling out. The rammer of a great gun is used for the same purpose. It has a round piece of wood at one end, and the other is usually rolled in a piece of sheep-skin, fitted to the bore of the piece, and is used to clear her after she has been discharged, which is called spunging the piece.

RAMPANT, in heraldry, a term applied to a lion, leopard, or other beast that stands on his hind legs, and rears up his fore feet in the posture of climbing, shewing only half his face, as one eye, &c. It is different from saliant, in which the beast seems springing forward as if making a sally. See plate CCXXVII. fig. 3.

RAMPART, in fortification, is an elevation of earth round a place capable of resisting the cannon of an enemy; and formed into bastions, curtains, &c. See **FORTIFICATION**, **BASTION**, &c.

A rampart ought to be sloped on both sides, and to be broad enough to allow room for the marching of waggons and cannon, beside that allowed for the parapet which is raised on it: its thickness is generally about ten or twelve fathom, and its height not above three, which is sufficient to cover the houses from the battery of the cannon. The rampart is encompassed with a ditch, and is sometimes lined or fortified on the inside, otherwise it has a berme. See the article **BERME**.

Upon the rampart soldiers continually keep guard, and pieces of artillery are planted there for the defence of the place.

RAMPART, in civil architecture, is used for the space left between the wall of a city, and the next houses.

RAMPHASTOS, in ornithology, a genus of birds, of the order of the pica, the beak of which is remarkably large, and without any visible nostrils; the toes are the same in number and the same way placed as in the parrot. See **PARROT**.

This genus comprehends the toucan, the

pepper-bird, and several other species. See the articles **TOUCAN**, &c.

RAMSEY, a market-town of Huntingdonshire, ten miles north-east of Huntingdon.

RAMSEY, an island in the Irish channel, on the coast of Pembroke-shire: west long. $5^{\circ} 20'$, north lat. $51^{\circ} 55'$.

RAMSGATE, a port-town of Kent, situated between the north and south Foreland, eight miles south-east of Canterbury.

RAMUS, in general, denotes a branch of any thing, as of a tree, an artery, vein, &c.

RANA, the **FROG**, in zoology. See the article **FROG**.

RANA PISCATRIX, the **FROG-FISH**, in ichthyology, a fish of a very irregular figure, not unlike that of a tadpole; its body being very inconsiderable in proportion to the vast size of its head, which has a very large mouth furnished with sharp teeth, and surrounded with fleshy tubercles; and on the under part of the body there are two fins resembling a mole's feet. See plate CCXXVII. fig. 4. It is the same with the lophius. See the article **LOPHIUS**.

RANA, or **RANULA**. See **RANULA**.

RANCHIERA, a port-town of Terra Firma, situated in west long. 72° , north lat. $11^{\circ} 34'$.

RANCID, denotes a fatty substance that is become rank or musty; or has contracted an ill smell by being kept close.

RANDIA, a genus of plants, the class of which is not yet fully ascertained: its flower is monopetalous, and of the shape of a saucer; the limb is divided into five segments: the fruit is an oval, unilocular capsule, containing numerous compressed seeds, surrounded with a pulp.

RANDOM SHOT, in gunnery, is a shot made when the muzzle of a gun is raised above the horizontal line, and is not designed to shoot directly, or point blank. The utmost random of any piece is about ten times as far as the bullet will go point blank. The bullet will go farthest when the piece is mounted to about 4.5° above the level range. See **GUNNERY**.

RANFORCE RING. See the article **REINFORCED RING**.

RANGE, in gunnery, the path of a bullet, or the line it describes from the mouth of the piece to the point where it lodges. If the piece lie in a line parallel to the horizon, it is called the right or level range: if it be mounted to 4.5° , it is said to

to have the utmost range, all others between 00° and 45° are called the intermediate ranges.

RANGER, a sworn officer of a forest, appointed by the king's letters-patent, whose business is to walk through his charge, to drive back the deer out of the purlicues, &c. and to present all trespasses within his jurisdiction at the next forest-court.

RANGES, in a ship, two pieces of timber that go across from side to side; the one on the fore-castle, a little abaft the fore-mast, and the other in the beak-head, before the woudlings of the bow-sprit.

RANGIFER, the REIN-DEER. See the article REIN-DEER.

RANGING, in war, disposing the troops in the order proper for an engagement, or for marching.

RANGING, in building, signifies running strain, when the sides of a work do not break into angles.

RANINE VEINS. See **RANULARES**.

RANK, the order or place allotted a person, suitable to his quality or merit.

RANK, in war, is a row of soldiers, placed side by side.

To double the ranks, is to put two ranks into one. To close the ranks, is to bring the men nearer; and to open them, is to set them farther apart.

RANSOM, a sum of money paid for the redemption of a slave, or for the liberty of a prisoner of war. In our law-books, ransom is also used for a sum paid for the pardon of some great offence, and to obtain the offender's liberty.

RANT, in the drama, an extravagant, unnatural, and improbable flight of passion.

RANULA, or **RANA**, in medicine, a tumour under the tongue, which like a ligature hinders a child from speaking or sucking.

The matter contained in these tumours is various, it being sometimes a tenacious and mucous lymph, sometimes a thick and purulent matter, and sometimes of a hard and stony consistence. The safest method of cure, according to Heister, is to turn the tongue upwards, and to make a transverse incision through the tumour, in order to discharge the included matter; after which you may deterge or destroy the remaining tunic with honey of roses sharpened with spirits of vitriol, and then the cure may be easily completed with a mixture of oil and sugar. Sometimes the tubercle breaks

of itself, and then you must deterge and heal the ulcer as before.

RANULARES, or **RANINE VEINS**, in anatomy, two veins under the apex of the tongue, which arise from the internal jugular, and run on either side the linea mediana. See the article TONGUE.

RANUNCULUS, **CROWFOOT**, in botany, a genus of the polyandria-polygynia class of plants, the flower of which consists of five obtuse petals: there is no pericarpium; the seeds, which are numerous, being connected to the receptacle, by means of very short peduncles. See plate CCXXVII. fig. 5.

This genus comprehends the ficaria, ranunculus, and ranunculoides of authors: there are a great many species of it in our meadow and pasture grounds, where they remain after the pasture is grazed; because being very acrid, the cattle never eat them, otherwise they would blister their mouths and throats.

RAOLCONDA, a city of the hither India, situated in the province of Golconda: east long. 79° , north lat. $17^{\circ} 12'$.

RAPACIOUS ANIMALS, are such as live upon prey.

The characteristic marks of rapacious birds are, that they have a large head and a short neck, hooked, strong, and sharp-pointed talons, a sharp sight, a membranous stomach, and not a muscular one, or a gizzard like birds that live on grain.

RAPA, **RAPE**, in botany, is made by Linnæus a species of brassica.

RAPE, in law, the having carnal knowledge of a woman by force and against her will. By statute, whoever carnally knows a female child under ten years of age, shall suffer as a felon; and here it does not signify whether such child consented, or was forced; it is only to be proved that the offender entered her body; the crime itself consists in penetration and emission: but where there is neither of these, an attempt to ravish, be it never so outrageous, is deemed only an assault. In case a woman conceives, it is held to be no rape, from an opinion, that she cannot conceive unless she consent. However, it is no excuse that a woman at last yielded to the violence and consented, if her consent was extorted by the fear of death and imprisonment. However, it is a strong presumption against the woman, if she make no complaint within forty days after the injury, which

which is the time allowed by law. A woman who has been ravished may prosecute, and likewise be a witness in her own cause; but it is remarked by chief justice Hales, that how far the woman's testimony is to be believed, must be entirely left to the jury on the trial; it being more or less credible according to the circumstances of the fact. The aiders and abettors in the commission of a rape are indistinct as principals, and are guilty of felony without benefit of clergy. Antiently this crime was not deemed felony: but it was punished with the loss of the offenders eyes and privy members.

The civilians make another kind of rape, called rape of subordination or seduction; which is seducing a maid either to uncleanness or marriage, and that by gentle means, provided there be a considerable disparity in the age and circumstances of the parties. See the article RAVISHMENT.

RAPE of the forest, a trespass committed in a forest by violence. See FOREST.

RAPE is also a name given to a division of a county, and sometimes means the same as a hundred, and at other times signifies a division consisting of several hundreds; thus Suffex is divided into six rapes, every one of which, besides its hundreds, has a castle, a river, and a forest belonging to it. The like parts in other counties are called tithings, lathes, or wapentakes.

RAPE also signifies the stalks of the clusters of grapes when dried, and freed from the fruit. This is used in making vinegar. See the article VINEGAR.

RAPE-SEED, the seed of a plant described by authors under the name of *napus sylvestris* and *bunias sylvestris*. See the article NAPUS.

Rape-seed is cultivated to great advantage in several counties in England, particularly in Lincolnshire, and considerable quantities of it are brought from Holland. From this seed is drawn an oil called rape-oil, which is used in the woollen manufacture, and in the materia medica, is esteemed attenuant, cordial, and sudorific.

Rape-seed, on being imported, pays a duty of 5 l. 13 s. 6 d. the last, containing ten quarters, and draws back, on exportation, 5 l. 8 s. 9 d.

RAPHANUS, the RADISH, in botany, a genus of the tetradynamia class of plants, the flower of which consists of four leaves

disposed in the form of a cross: its fruit is a pod, containing several roundish and smooth seeds.

Radishes are attenuant, and good in scurvy and other disorders proceeding from viscidities of the juices, and other obstructions of the glands.

RAPHIDIA, in zoology, a genus of four-winged insects of the neuroptera order; the head of which is of a horny substance, and depressed; and its tail is armed with a slender horny weapon, not bifid at the extremity: it is about the size of the scorpion fly, and is common in meadows in July.

RAPIER, formerly signified a long, old-fashioned broad sword, such as those worn by the common soldiers: but it is now denotes a small sword, as contrarily distinguished from a back-sword.

RAPINE, in law, taking away another's goods, &c. openly and by violence.

RAPOLLA, a town of Italy, in the kingdom of Naples, sixty-six miles east of Naples.

RAPPAHANOCK, a large navigable river which rises in the mountains west of Virginia, and discharges itself into the bay of Chesapeake.

RAPPERSWEIT, a town of Switzerland, in the canton of Zurich, seventeen miles south-east of the city of Zurich.

RAPSODY. See RHAPSODY.

RAPTUM HÆREDIS, an antient writ which lay at common law, for taking away an heir that held land in socage. See the article RAVISHMENT.

RAPTURE, an extasy, or transport of mind. See EXTASY, ENTHUSIASM, &c.

RARE, in physics; stands opposed to dense, and denotes a body that is very porous, whose parts are at a great distance from one another, and which contains but little matter under a large bulk. See the following article.

RAREFACTION, *rarefactio*, in physics, the act whereby a body is rendered rare; that is, brought to possess more room, or appear under a larger bulk without accession of any new matter.

Rarefaction is opposed to condensation. See the articles CONDENSATION, COMPRESSION, and DENSITY.

Rarefaction is most properly restrained to that expansion of a mass into a larger bulk, which is effected by heat. All expansion from other causes they call dilatation. See the articles EXPANSION, DILATATION, and FIRE.

It is by rarefaction that gunpowder has its

its effect, and to the same principle also we owe our æolipiles, thermometers, &c. The degree to which the air is rarifiable, exceeds all imagination; such is the rarefaction of common air from its own principle of elasticity, and without any previous condensation, that Mr. Boyle found it to dilate itself so as to take up 13679 times its former space; and when compressed, the same author found its greatest space when most rarified, to its least when most condensed, as 550000 to 1. See AIR and ATMOSPHERE.

Such an immense rarefaction, Sir Isaac Newton shews is inconceivable on any other principle than that of a repelling force inherent in the air, whereby its particles mutually fly from one another. This repelling force, he observes, is much more considerable in air than in other bodies, as being generated from the most fixed bodies, and that with much difficulty, and scarce without fermentation; those principles being always found to fly each other with the most force, which, when in contact, cohere the most firmly. M. Mariotte established this as a principle, from experiments, that the different rarefactions or condensations of the air, follow the proportion of the weights wherewith it is pressed. Hence, supposing the mercury in the level of the sea suspended to 28 inches, which is the weight of the whole atmosphere; and that 60 feet height of air are equivalent to a line or $\frac{1}{14}$ of an inch of mercury, so that the barometer at the height of 60 feet from the sea, would fall a line. It is easy finding what height of air would be equal to a second, or any other line of mercury; for, as 28 inches of mercury $\frac{1}{2}$ are to 28 inches, so is the height of 60 feet of air to a fourth term, which is the height of air corresponding to a second line of mercury. And after the same manner may the height of air corresponding to each line be found, which will make a geometrical progression, the sum whereof will be the whole height of the atmosphere, and of consequence a certain part of that sum will be the height of a mountain, at whose top the barometer shall have sunk a certain quantity. See the article BAROMETER.

Mess. Cassini and Maraldi, upon measuring the heights of several mountains, found that this progression of M. Mariotte was defective; that it always gave the height of the mountains, and consequently the rarefactions, less than they really

were; and from some farther experiments M. Amontons found, that the principles will only hold in the mean rarefactions, not the extremes. See the article MOUNTAIN.

The open air, in which we breathe, says Sir Isaac Newton, is 8 or 900 times lighter than water, and by consequence 8 or 900 times rarer. And since the air is compressed by the weight of the incumbent atmosphere, and the density of the air is proportionable to the compressing force, it follows by computation, that at the height of about seven english miles from the earth, the air is four times rarer than at the surface of the earth; and at the height of 14 miles, it is 16 times rarer than at the surface of the earth; and at the height of 21, 28, or 35 miles, it is respectively 64, 256, or 1024 times rarer, or thereabouts; and at the height of 70, 140, and 210 miles, it is about 1000000, 1000000000000, or 10000000000000000, &c.

Mr. Cotes has found, from experiments made with a thermometer, that linseed-oil is rarified in the proportion of 40 to 39 in the heat of the human body; in that of 15 to 14, in that degree of heat wherein water is made to boil; in the proportion of 15 to 13, in that degree of heat wherein melted tin begins to harden; and, finally, in the proportion of 23 to 20, in that degree wherein melted tin arrives at a perfect solidity. The same author discovered, that the rarefaction of the air in the same degree of heat is ten times greater than that of the linseed-oil; and the rarefaction of the oil, about fifteen times greater than that of the spirit of wine.

RAREFACTIVES, in medicine, remedies which open and enlarge the pores of the skin, to give an easy vent to the matter of perspiration: or such medicines as rarely the blood, as anise, mallows, pelitory, chamomile-flowers, linseed, &c.

RASANT, or **RAZANT**, in fortification. Rasant-flank, or line, is that part of the curtain or flank whence the shot exploded rase, or glance, along the surface of the opposite bastion.

RASEBURG, a port town of Sweden, in the province of Finland, and territory of Nyland, situated on the gulph of Finland: east long. 23°, north lat. 60° 22'.

RASEN, a market-town of Lincolnshire, situated twelve miles north-east of Lincoln.

RASH, in medicine, an eruption upon the

skin, thrown out in fevers or surfeits.
RASP, a rank sort of file. See **FILE**.

RASTAT, the name of two towns of Germany; one in the circle of Bavaria, and archbishopric of Saltzburg, situated on the river Ens, thirty-five miles south of the city Ens; another in the circle of Swabia, and marquise of Baden, situated on the east side of the river Rhine, twenty-one miles south-west of Philipzburg.

RAT, in zoology, the english name of several species of the mus-kind; as the common-rat, the ground-rat, and the water-rat. See plate CCXXVII. fig. 6. where n^o 1. represents the common, and n^o 2. the ground-rat.

The common rat is a quadruped too well known to need much description. It is of a brownish grey colour, with a long and almost naked tail. It greatly resembles the common mouse in form, but is at least five times as large: the tail is divided into more than an hundred and fifty annular joints.

The ground-rat is nearly of the size of the common rat, only that its tail is much shorter, as well as more hairy. The water-rat is considerably larger than the common kind: its tail is all the way of the same thickness, and is abrupt at the end: its legs are shorter than those of the common rat, but its feet are longer, and the toes connected by membranes.

Norway-RAT. See **NORWAY**.

RAT-TAILS, or **ARRESTS**, in the manege, signify hard callous swellings upon the hinder legs under the hough, running along the sinew.

A horse is called rat-tail, when he has no hair upon his tail.

RATAFIA, a fine spirituous liquor, prepared from the kernels, &c. of several kinds of fruit, particularly of cherries, and apricots.

Ratafia of cherries is prepared by bruising the cherries, and putting them into a vessel wherein brandy has been long kept; then adding to them the kernels of cherries, with strawberries, sugar, cinnamon, white pepper, nutmegs, cloves; and to twenty pound of cherries, ten quarts of brandy. The vessel is left open ten or twelve days, and then stopp'd close for two months before it be tapped. Ratafia of apricots is prepared two ways, *viz.* either by boiling the apricots in white wine, adding to the liquor an equal quantity of brandy with sugar, cinnamon, mace, and the kernels of apricots;

infusing the whole for eight or ten days; then straining the liquor, and putting it up for use; or else by infusing the apricots cut in pieces in brandy, for a day or two, passing it through a straining bag, and then putting in the usual ingredients.

RATCH, or **RASH**, in clock-workk, a sort of wheel having twelve fangs, which serve to lift up the detents every hhour; and make the clock strike. See **CLOCK**.

RATCHETS, in a watch, are the small teeth at the bottom of the fusey, or barrel, which stops it in winding up.

RATE, a standard or proportion,, by which either the quantity or value of a thing is adjusted.

RATE-TYTHE, when sheep or other cattle are kept in a parish for less time than a year, the owner must pay tythe for them *pro rata*, according to the custom off the place.

RATE of a ship of war is its order,, degree, or distinction, as to magnitude, burden, &c. The rate is usually accounted by the length and breadth of the gun-deck, the number of tons, and the number of men and guns the vessel carries. Of these there are six rates. A first rate man of war has its gun-deck from 159 to 174 feet in length, and from 44 to 50 feet broad; it contains from 1313 to 1882 tons, has from 7066 to 800 men, and carries from 96 to 100 guns. Second rate ships have their gun-decks from 153 to 165 feet long, and from 41 to 46 broad; they contain from 1086 to 1482 tons, and carry from 524 to 640 men, and from 84 to 90 guns. Third rates have their gun-decks from 140 to 158 feet in length, from 37 to 42 feet broad; they contain from 1871 to 1262 tons; carry from 389 to 476 men, and from 64 to 80 guns. Fourth rates are in length on the gun-decks from 118 to 146 feet, and from 299 to 38 broad; they contain from 448 to 1915 tons; carry from 226 to 346 men, and from 48 to 60 guns. Fifth rates have their gun-decks from 100 to 120 feet long, and from 24 to 31 broad; they contain from 259 to 542 tons, and carry from 145 to 190 men, and from 26 to 44 guns. Sixth rates have their gun-decks from 87 to 95 feet long, and from 22 to 25 broad; they contain from 1522 to 256 tons, carry from 50 to 110 men, and from 16 to 24 guns.

It is to be observed, that the new-built ships

ships are much larger, as well as better, than the old ones of the same rate; whence the double numbers all along: the larger of which express the proportions of the new-built ships, as the less those of the old ones. See the articles *SHIP* and *NAVY*.

RATEEN, or **RATTEN**, in commerce, a thick woollen-stuff, quilted, woven on a loom with four treddles, like serges, and other stuffs, that have the whale or quilting. There are some rateens dressed and prepared like cloths; others left simply in the hair, and others where the hair or knap is frized. Rateens are chiefly manufactured in France, Holland, and Italy, and are mostly used in linings. The frize is a sort of coarse rateen, and the druggit is a rateen half linen, half woollen.

RATIFICATION, *ratificatio*, an act approving of, and confirming something done by another in our name.

This word is particularly used in our laws for the confirmation of a clerk in a benefice, prebend, &c. formerly given him by the bishop, &c. where the right of patronage is doubted to be in the king. Ratification is also used for an act confirming something we ourselves have done in our own name.

RATIO, in arithmetic and geometry, is that relation of homogeneous things which determines the quantity of one from the quantity of another, without the intervention of a third.

Two numbers, lines, or quantities, A and B, being proposed, their relation one to another may be considered under one of these two heads: 1. How much A exceeds B, or B exceeds A; and this is found by taking A from B, or B from A, and is called arithmetic reason or ratio. 2. Or how many times, and parts of a time, A contains B, or B contains A; and this is called geometric reason or ratio; (or, as Euclid defines it, it is the mutual habitude, or respect, of two magnitudes of the same kind, according to quantity; that is, as to how often the one contains, or is contained, in the other) and is found by dividing A by B, or B by A; and here note, that that quantity which is referred to another quantity, is called the antecedent of the ratio; and that to which the other is referred, is called the consequent of the ratio; as, in the ratio of A to B, A is the antecedent, and B the consequent. Therefore any quantity, as antecedent,

divided by any quantity as a consequent, gives the ratio of that antecedent to the consequent.

Thus the ratio of A to B is $\frac{A}{B}$, but the ratio of B to A is $\frac{B}{A}$; and, in numbers,

the ratio of 12 to 4 is $\frac{12}{4} = 3$, or triple;

but the ratio of 4 to 12 is $\frac{4}{12} = \frac{1}{3}$, or

subtriple.

And here note, that the quantities, thus compared, must be of the same kind; that is, such, which, by multiplication, may be made to exceed one the other, or as these quantities are said to have a ratio between them, which, being multiplied, may be made to exceed one another. Thus a line, how short soever, may be multiplied, that is, produced so long as to exceed in length any given right line, and consequently these may be compared together, and the ratio expressed; but as a line can never, by any multiplication whatever, be made to have breadth, that is, to be made equal to a superficies, how small soever; these can therefore never be compared together, and consequently have no ratio or respect one to another, according to quantity; that is, as to how often the one contains, or is contained in the other. See the article *PROPORTION*.

RATIOCINATION, *rationatio*, the act of reasoning. See *REASONING*.

RATION, or **RATIAN**, in the army, a portion of ammunition, bread, drink, and forage, distributed to each soldier in the army, for his daily subsistence, &c. The horse have rations of hay and oats when they cannot go out to forage. The rations of bread are regulated by weight. The ordinary ration of a foot soldier is a pound and a half of bread per day. The officers have several rations according to their quality and the number of attendants that they are obliged to keep. When the ration is augmented on occasions of rejoicing, it is called a double ration. The ships crews have also their rations or allowances of biscuit, pulse, and water, proportioned according to their stock,

RATIONABLES EXPENSÆ, *reasonable expenses*. The commons in parliament, as well as the proctors of the clergy, in convocation, were antiently allowed rationabiles expensas; that is, such allowance as the king, considering the

prices of all things, shall judge meet to impose on the people, to pay for the subsistence of their representatives.

RATIONABILI *parte bonorum*, in law, is a writ which lies for the widow against the executors of her deceased husband, who deny to give her the third part of his goods after the debts and funeral charges are paid. It is observed, that by the common law of England, the goods of a deceased person, his debts being first paid, shall be divided into three equal parts, and go to the wife, her children, and executors; wherefore this writ may be brought by the children as well as the widow. But it has been held that the writ only lies where the custom of the country warrants it.

RATIONABILIBUS *divisiis*, in law, a writ that is brought where there are two lords in different towns, who have signories adjoining together, and one of them finds his waste by little and little to have been incroached upon; then the lord on whose ground the incroachment was made shall have this writ against the other to rectify the bounds and divisions. In which respect it is said by Fitzherbert, to be in its nature a writ of right.

RATIONAL, *reasonable*. See **REASON**.

RATIONAL is also applied to integral, fractional, and mixt numbers: thus we say rational fraction, rational integer, and rational mixt number; for the explanation and doctrine of which, see **NUMBER** and **FRACTION**.

Rational is applied to the true horizon, in opposition to the sensible or apparent one. See the article **HORIZON**.

Rational is also applied to quantity, ratio, &c. See **QUANTITY**, **RATIO**, &c.

RATIONALE, a solution, or account of the principles of some opinion, action, hypothesis, phenomenon, or the like. See **PRINCIPLE**, **PHENOMENON**, &c.
Hence *rationale* is the title of several books.

RATIONALE is also the latin name for an ancient sacerdotal vestment, worn by the high priest, under the old law, being a piece of embroidered stuff, worn on the breast, about as span square. A *rationale* appears to have been antiently worn by the bishops, under the new law; but authors are in doubt about its form; some having it to resemble that of the Jews; others taking it to be only the pallium. See the article **PALLIUM**.

RATIONIS *os*, in anatomy, a term some-

times used for the *os frontis*. See the article **FRONTIS OS**.

RATIPOR, a town of Bohemia, in the duchy of Silesia, situated on the river Oder, sixteen miles north-east of Tropol-paw.

RATIPOR is also a city of hither Indidia, capital of the province of Malva, situated east long. 80° , north lat. 25° .

RATISBON, a city of Germany, in the circle of Bavaria, situated at the confluence of the rivers Danube and Reggen, in east longit. $12^{\circ} 5'$, north lat. $49^{\circ} 9'$. This is a free imperial city, and here the assembly or diet of the states of the empire meets. See the article **DIET**.

RATLINES, or as the seamen call them, **RATLINS**, those lines which make the ladder steps to get up the shrouds and pullocks, hence called the ratlins of the shrouds.

RATTLE, among the antients, a musical instrument of the pulsative kind, called by the Romans *crepitaculum*. The *tintinnabulum*, *crotalum*, and *sistrum*, were by the same esteemed only so many different kinds of rattles. See the articles **BELL**, **CROTALUM**, and **SISTRUM**.

What we commonly call rattles now, is no more than a stick of wax in a silver handle, to which is suspended a number of little bells of the same, or some other metal, serving in the hands of children to make a rattling or tinkling noise, or otherwise to play withal.

Rattles for children the gross, containing twelve dozen, pay, on importation, 1 s. 1⁸/₁₀ d. and, on exportation, draw back 1 s. 1⁵/₁₀ d.

RATTLE-SNAKE, *crotalophorus*, in zoology, a genus of serpents, having scuta that cover the whole under-surface of the body and tail, and having the extremity of the body terminated by a kind of rattle, formed of a series of unceasing articulations, which are moveable, and make a noise. See plate **CCXXVIII.** fig. 1.

Of this serpent, there are two species, the greater one with the scuta of the abdomen a hundred and seventy-two, of the tail twenty-one; and the lesser rattlesnake, having the scuta of the abdomen a hundred and sixty-five, of the tail twenty-eight. The larger is a very terrible, and, at its full growth, a very large serpent, growing to eight feet in length, with a proportionable thickness; the head is large, broad, depressed, and

Fig. 1. The RATTLE-SNAKE

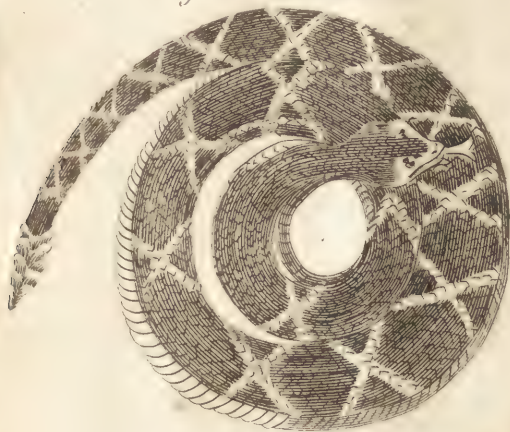


Fig. 2. RAYONANT



Fig. 3. RECEIVERS

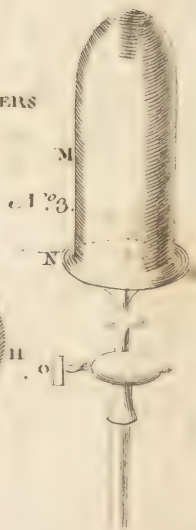
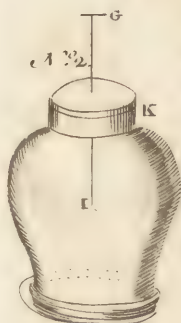
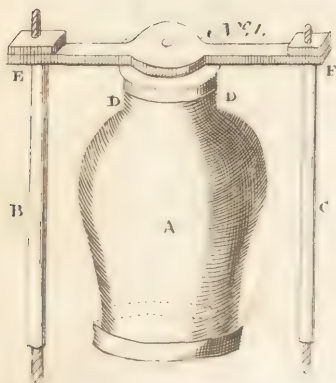
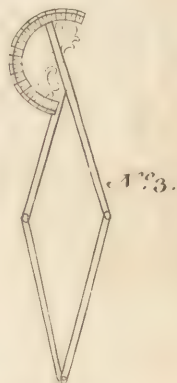
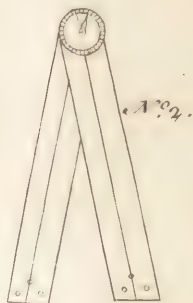


Fig. 4. RECTANGLE





of a pale brown: the iris of the eye is red; the back is of a brown colour, with an admixture of a ruddy yellow, and variegated with a great many irregular transverse lists, of a deep black: the belly is of a palish blue; the rattle is of a firm, and as it were of a horny substance, and brown colour, composed of a number of cells, which are articulated one within another, which articulations being very loose, the included points strike against the inner surface of the rings they are admitted into, and make that rattling noise, when the serpent vibrates, or shakes its tail. This serpent is frequent in the woods of America: the bite is fatal, but it is easy to avoid it, the creature being sluggish, moving slowly, never attacking a man unless provoked, and giving notice before it bites by shaking its rattle.

The lesser species of this serpent grows to about seven feet in length, and in most particulars is like the former one, and its bite is equally mischievous.

RATTLE-SNAKE-ROOT, the same with the fenega, a species of polygala. See the article **POLYGALA**.

RAVA, a city of Great Poland, capital of the Palatinate of Rava, situated fifty miles south-east of Warsaw.

RAUCEDO, *hoarseness*, in medicine. See the article **HOARSENESS**.

RAVELIN, in fortification, was antiently a flat bastion, placed in the middle of a curtain; but now a detached work composed only of two faces, which make a salient angle, without any flanks, and raised before the curtain on the counter-scarp of the place. A ravelin is a triangular work, resembling the point of a bastion, with the flanks cut off. See the article **FORTIFICATION**.

Its use before a curtain is to cover the opposite flanks of the two next bastions. It is used also to cover a bridge, or a gate, and is always placed without the moat. There are also double ravelins that serve to cover each other: they are said to be double, when they are joined by a curtain. See the article **CURTIN**.

RAVEN, in ornithology, a species of the corvus, of the bigness of a common hen, of a black colour, with a blue back; the head is small, depressed on the crown, and flattened on both sides; the eyes are large, bright and piercing; the beak is considerably long and thick, and somewhat rigid on the back, and sharp at the point. See the article **CORVUS**.

RAVENGLAS, a port town of Cumberland, situated on the Irish Channel, thirty-eight miles south-west of Carlisle.

RAVENNA, a city of Italy, in the pope's territories, capital of the province of Romania, situated east long. 13°, north lat. 44° 30'.

RAVISHMENT, in law, denotes an unlawful seducing either of a woman, or an heir that is in ward: sometimes it is also used in the same sense as a rape. See the article **RAPE**.

RAVISHMENT de garde, in law, was a writ that formerly lay for the guardian by knight's service, or in socage, against a person who took from him the body of his ward.

RAUVOLFIA, in botany, a genus of the pentandria-monogynia class of plants, the corolla of which consists of a single funnel fashioned petal, with a large limb, divided into five lanceolated segments: the fruit is a very large, roundish and fleshy bilocular drupe, with a single ovated nut in each cell.

RAY, in optics, a beam of light, emitted from a radiant, or luminous body. See the article **LIGHT**.

Rays are defined by Sir Isaac Newton, to be the least parts of light, whether successive in the same line, or cotemporary in several lines. For that light consists of parts of both kinds is evident, since one may stop what comes this moment in any point, and let pass that which comes presently after: now the least light, or part of light, which may be thus stopped, he calls a ray of light.

A ray, or right line, drawn from the point of concurrence of the two optical axes, through the middle of the right line, which passes by the centers of the two pupils of the eyes, is by some called a common ray. See the article **VISION**. As for direct, converging and diverging rays; rays of incidence, inflection, refraction, curvature, &c. see the articles **DIRECT**, **CONVERGING**, &c.

RAY-FISH, *raja*. See the article **RAJA**.

RAYLEIGH, a market town of Essex, ten miles south-east of Chelmsford.

RAYONANT, or *Cross* **RAYONANT**, in heraldry, one which has rays of glory behind it, darting out from the center to all the quarters of the escutcheon, as represented in plate CCXXVIII. fig. 2.

RAZANT, or **RASANT**. See **RASANT**.

RAZOR, a well known instrument, used by surgeons, barbers, &c. for shaving off the hair from various parts of the body.

All

All razors are prohibited to be imported.

RAZOR-BILL, *alka*, in ornithology. See the article **ALKA**.

RAZOR-FISH, *dactylus*, a species of solen. See the article **SOLE**.

RE, in grammar, an inseparable particle added to the beginning of words, to double or otherwise modify their meaning; as in re-action, re-move, re-export, &c.

REACH, in the sea-language, signifies the distance between any two points of land, lying nearly in a right line.

RE-ACTION, in physiology, the resistance made by all bodies to the action or impulse of others, that endeavour to change its state whether of motion or rest. See the articles **ACTION** and **MOTION**.

The cause of the re-action of bodies is no other than their inertia. See **INERTIA**.

READING, a borough-town in Berkshire, situated forty miles west of London, near the confluence of the rivers Kennet and Thames; it sends two members to parliament.

READINGS, or *various READINGS*, *varia lectiones*, in criticism, are the different manner of reading the texts of authors in ancient manuscripts, where a diversity has arisen from the corruption of time, or the ignorance of copyists. A great part of the business of critics lies in settling the readings by confronting the various readings of the several manuscripts, and considering the agreement of the words and sense.

Readings are also used for a sort of commentary or gloss on a law, text, passage, or the like, to shew the sense an author takes it in, and the application he conceives to be made of it.

RE-AFFORESTED, is where a forest, having been disafforested, is again made a forest. See the article **FOREST**.

RE-AGGRAVATION, in the romish ecclesiastical law, the last monitory published after three admonitions, and before the last excommunication. Before they proceed to fulminate the last excommunication, they publish an aggravation, and a re-aggravation. See the article **EXCOMMUNICATION**.

REAL, *reale*, is applied to a being that actually exists, in which sense it coincides with actual. See the article **ACTUAL**.

REAL, in law, is opposed to personal. See the article **PERSONAL**.

Thus real action is that whereby the plaintiff lays title to land, &c. See the article **ACTION**, &c.

REAL, or **CHIAPA**, a city of Mexico, in North America, capital of the province of Chiapa, situated west long. 97°, north lat. 17°.

REALEIO, a port-town of Mexico, in the province of Niagaragua, situated on the bay of the Pacific Ocean, in west long. 91° 30', north lat. 12°.

REALGAR, *risgallum*, in the materia medica, a name whereby the sandarach has been a long time known in the shops. It has been also attributed to the fictitious red arsenic. See the articles **SANDARACH**, and **ARSENIC**.

REALISTS, *realistæ*, a sect of school philosophers, formed in opposition to the nominalists. See **NOMINALS**.

Under the realists are included the scotists, thomists, and all excepting the followers of Ocham. Their distinguishing tenet is that universals are realities, and have an actual existence out of an idea, or imagination; or, as they express it in the schools, a *parte rei*; whereas the nominalists contend that they exist only in the mind, and are only ideas, or manners of conceiving things.

REALITY, *realitas*, in the schools, a diminutive of *res*, thing, first used by the scotists, to denote a thing which may exist of itself; or which has a full and absolute being of itself, and is not considered as a part of any other.

REALM, *regnum*, a country which gives its head, or governor, the denomination of a king.

REALMONT, a town of France, in the province of Languedoc, situated thirty-two miles north-east of Toulouse.

REAR, a term frequently used in composition, to denote something behind, or backwards, in respect of another, in opposition to van: thus, in a military sense, it is used for the hind part of an army, in opposition to the front. For the rear-guard, rear-half files, rear-line, rear-rank, and rear-admiral, see **GUARD**, **FILE**, **LINE**, **RANK**, and **ADMIRAL**.

REASON, *ratio*, a faculty, or power, of the mind, whereby it distinguishes good from evil, truth from falsehood; whereby man is distinguished from beasts; and wherein it is evident he greatly surpasses them: or reason is that principle whereby, comparing several ideas together, we draw consequences from the relations they are found to have. See the article **REASONING**.

Some define reason to be the comprehension of many principles which the mind

mind successively can conceive, and from which conclusions may be drawn. And others conceive reason as no other than the understanding itself considered as it discourses. See UNDERSTANDING.

Reason, Mr. Locke observes, contains two distinct faculties of the mind, *viz.* sagacity, whereby it finds intermediate ideas; and illation, whereby it so orders and disposes of them, as to discover what connection there is in each link of the chain, whereby the extremes are held together; and thereby, as it were, draws into view the truth sought for. Illation, or inference, consists in nothing but the perception of the connection there is between the ideas in each step of the deduction, whereby the mind comes to see either the agreement or disagreement of any two ideas, as in demonstration, in which it arrives at knowledge; or their probable connection, on which it gives or with-holds its assent, as in opinion. See the articles DEMONSTRATION, KNOWLEDGE, &c.

Sense and intuition reach but a little way, the greatest part of our knowledge depends upon deductions and intermediate ideas. In those cases where we must take propositions for true, without being certain that they are so, we would need to find out, examine, and compare the grounds of their probability. In both cases the faculty which finds out the means, and rightly applies them to discover certainty in the one, and probability in the other, is that which we call reason. In reason, therefore, we may consider four degrees; first, the discovering and finding out of proofs. See the article INVENTION.

Secondly, the regular and methodical disposition of them, and laying them in such order, as that their connection may be plainly perceived. See METHOD.

Thirdly, the perceiving of their connection. See JUDGMENT. And,

Fourthly, the making a right conclusion. See the article CONCLUSION.

Concerning reason, Mr. Locke thinks that syllogism, as was generally thought, is not the proper instrument of it, nor the usefulest way of exercising this faculty. See SYLLOGISM.

Reason, though of very large extent, fails us in several instances, as first, where our ideas fail; secondly, it is often at a loss, because of the obscurity, confusion, or imperfection of the ideas it is employed about: thus, having no perfect idea of the least extension of matter, nor of in-

finiteness, we are at a loss about the divisibility of matter. Thirdly, our reason is often at a stand, because it perceives not those ideas which would serve to shew the certain or probable agreement or disagreement of any two other ideas. Fourthly, our reason is very often engaged in absurdities, and difficulties, by proceeding upon false principles, which being followed, lead men into contradictions to themselves and inconsistency in their own thoughts. Fifthly, dubious words, and uncertain signs, often puzzle men's reason, and bring them to a nonplus.

Though the deducing one proposition from another be a great part of reason, and that which it is usually employed about, yet the principal act of ratiocination is the finding the agreement or disagreement of two ideas one with another by the intervention of a third; as a man by a yard finds two houses to be of the same length, which could not be brought together to measure their equality by juxtaposition. Words have their consequences as the signs of such ideas; and things agree or disagree with what they really are, but we observe it only by our ideas. Hence we may be able to form an idea of that ordinary distinction of things into those that are according to, those that are above, and those contrary to, reason. Those according to reason, are such propositions whose truth we can discover by examining and tracing those ideas we have from sensation and reflection, and by a natural deduction find to be true or probable. Above reason are such propositions, whose truth or probability we cannot by reason derive from these principles. Contrary to reason are such propositions as are inconsistent with, or irreconcilable to, our clear and distinct ideas. Thus the existence of one God is according to reason; the existence of more than one God, contrary to reason; and the resurrection of the body after death, above reason. Above reason may also be taken in a double sense, *viz.* above probability, or above certainty.

Reason, as contradistinguished to faith, Mr. Locke takes to be the discovery of the certainty or probability of such propositions or truths, as the mind arrives at, by deductions made from such ideas, which it has got by the use of its natural faculties, *viz.* by sensation or reflection; whereas faith, on the other hand, is the assent to any proposition upon the credit of the proposer, as coming immediately from

from God, which we call revelation.

See FAITH and REVELATION.

This use of the word reason, our author takes to be very improper; faith, as has been already observed, being nothing else but a firm assent of the mind, which if regulated, as is our duty, cannot be afforded to any thing but upon good reason, and so cannot be opposite to it.

REASON is also taken in different other significations; sometimes it denotes true and clear principles; sometimes it is taken for clear and fair deductions from these principles; and sometimes for the cause, particularly the final cause.

REASONABLE AID was antiently a duty that the lord of the fee claimed of his tenants holding by knight's service, or socage, towards marrying his daughter, or the making his eldest son a knight.

REASONING, RATIOCINATION, the exercise of the faculty of the mind called reason; or it is an act or operation of the mind, deducing some unknown proposition from other previous ones that are evident and known. See REASON.

It often happens in the comparing ideas together, that their agreement or disagreement cannot be discerned at first view, especially if they are of such a nature as not to admit of an exact application to one another: here then, as has been already observed under REASON, it becomes necessary to look out after some third idea that will admit of such an application as the present case requires. Hence it appears that every act of reasoning necessarily includes three distinct judgments, two wherein the ideas whose relation we want to discover, are severally compared with the middle idea, and a third wherein they are themselves connected, or disjoined according to the result of that comparison. Now, as our judgments when put into words are called propositions; so the expressions of our reasonings are termed syllogisms. And hence it follows that as every act of reasoning implies three several judgments, so every syllogism must include three distinct propositions. See the article SYLLOGISM.

In order therefore to infer a conclusion by a single act of reasoning, the premises must be intuitive propositions; where they are not, previous syllogisms are required, in which case reasoning becomes a complicated act taken in a variety of successive steps. This frequently happens in tracing the more remote re-

lations of our ideas, where many middle terms being called in, the conclusion cannot be made out, but in consequence of a series of syllogisms following one another in train. Hence we may clearly perceive that reasoning, in the highest exercise of that faculty, is no more than an orderly combination of simple acts of reasoning. See DEMONSTRATION.

Thus we see that reasoning, beginning with first principles, rises gradually from one judgment to another, and connects them in such a manner that every stage of the progression brings intuitive certainty along with it.

All the aims of human reasoning may in the general be reduced to these two.

1. To rank things under those universal ideas to which they truly belong; and,
2. To ascribe to them their several attributes and properties in consequence of that distribution.

This first aim of reason then is to determine the genera and species of things: and the second end regards the sciences and the affairs of common life. See the articles GENUS, SPECIES, &c.

As in tracing the most distant relation of things we must always have recourse to intervening ideas, and are more or less successful in our researches, according to our acquaintance with those ideas, and ability of applying them, it is evident that to make a good reasoner two things are principally required; first, an extensive knowledge of those intermediate ideas, by means of which things may be compared one with another; secondly, the skill and talent of applying them happily in all particular instances that come under consideration.

There is another species of reasoning with two propositions, which seems to be compleat in itself, and where we admit the conclusion without supposing any tacit or suppressed judgment in the mind from which it follows syllogistically. This happens between propositions where the connection is such that the admission of the one necessarily, and at the first sight, implies the admission also of the other: for if it falls out that the proposition on which the other depends is self-evident, we content ourselves with barely affirming it, and infer that other by a direct conclusion: thus, by admitting an universal proposition we are forced also to admit of all the particular propositions comprehended under it; this being the very condition that

that constitutes a proposition universal. If then that universal proposition chances to be self evident, the particular ones follow of course, without any farther train of reasoning.

Another species of reasoning is that called by logicians induction; in order to the right understanding of which, it will be necessary to observe, that our general ideas are for the most part capable of various subdivisions: thus the idea of the lowest species may be subdivided into its several individuals; the idea of any genus into the different species it comprehends, and so of the rest. If then we suppose the distribution to be duly made, so as to take in the whole extent of the idea to which it belongs, then it is plain that all the subdivisions or parts of any idea taken together constitute that whole idea: thus the several individuals of any species taken together constitute the whole species, and all the various species comprehended under any genus make up the whole genus; this being allowed, it is apparent that whatever may be affirmed of all the several subdivisions and classes of any idea ought to be affirmed of the whole general idea to which these subdivisions belong. What may be affirmed of all the individuals of any species, may be affirmed of the whole species; and what may be affirmed of all the species of any genus, may also be affirmed of the whole genus. This way of reasoning, where we infer universally concerning any idea, what we had before affirmed or denied separately of all its several subdivisions and parts, is called reasoning by induction: thus, if we suppose the whole tribe of animals subdivided into men, beasts, birds, insects and fishes, and then reason concerning them in this manner; all men have a power of beginning motion, all beasts, birds, and insects have a power of beginning motion, all fishes have a power of beginning motion; therefore all animals have a power of beginning motion.

For the method of reasoning by a concatenation of syllogisms, see the article DEMONSTRATION.

For the method of reasoning by dilemma, see the article DILEMMA.

For the four arguments commonly used in reasoning, see ARGUMENT.

RE-ATTACHMENT, in law, is a second attachment of a person, who was

formerly attached and dismissed the court without day, on account of the not coming of the justices, or other such casualty; without which, a cause discontinued cannot be revived, but the defendant must plead de novo.

RE-BAPTISANTS, the same with anabaptists. See ANABAPTISTS.

REBATE, or REBATEMENT, in commerce, a term much used at Amsterdam, for an abatement in the price of several commodities, when the buyer, instead of taking time advances ready money.

Rebate, which among us is usually called prompt-payment, is estimated by months, and is only allowed for certain merchandize, which, according to the custom of Amsterdam, are

German wools,	} which are sold at	{	15	} months rebate.
Spanish wools,			21	
Ashes and pot-ashes,			18	
Italian silks,			33	
Sugars of Brasil,			18	

That is, those commodities are sold for ready money, only deducting or rebating the interest of the money, which need not have been paid till the end of 15, 21, &c. months. This interest is usually regulated on the foot of 8 per cent. per annum.

REBATEMENT, in heraldry, a diminution or abatement of the bearings in a coat of arms. See ABATEMENT.

REBEL, a town of Germany, in the dutchy of Mecklenburgh, thirty-two miles south-east of Gustrów.

REBELLION, a traiterous taking up of arms against the king by his own natural subjects, or those formerly subdued.

Commission of REBELLION. See the article COMMISSION.

REBELLIOUS ASSEMBLY, in law, an assembling together of twelve or more persons, with an intent of unlawfully making use of their own authority, to change or alter any laws of this kingdom, or to destroy the inclosures of any ground, or the banks of any fish-pond, pool or conduit, to the intent that it may lie waste and void; or to destroy the deer in any park, fish in fish-ponds, coney in any warren; or any house, barn, mills, or bays; or to burn stacks of corn, abate rents, or prices of victuals, &c. See the article RIOT.

REBOUND. See the article RECOIL.

REBUS, an ænigmatical representation of some name, &c. by using figures or pictures instead of words, or parts of words.

Camden mentions an instance of this absurd kind of wit in a gallant who expressed his love to a woman, named Rose Hill, by painting in the border of his gown a *rose*, a *bill*, an *eye*, a *loaf*, and a *well*; which, in the style of the rebus, reads, *Rose Hill I love well*. This kind of wit was long practised by the great, who took the pains to find devices for their names. It was, however, happily ridiculed by Ben Johnson, in the humorous description of Abel Drugger's device, in the Alchemist; and by the Spectator, in the device of Jack of Newberry; at which time the rebus, being raised to sign posts, was grown out of fashion at court.

REBUTTER, in law, the defendant's answer to the plaintiff's surrejoinder, in a cause depending in the court of chancery, &c. Also when a person warrants lands, &c. to another, and he that has the warranty, or his heir, sues him to whom the warranty is made, or his heirs or assignee for the same thing; if he, who is sued, plead the deed or fine with warranty, and pray judgment whether the plaintiff shall be received to demand the thing which he ought to warrant to the party, against the warranty in the deed, &c. this is called a rebutter.

RECANATI, a town of Italy, in the province of Ancona, six miles west of Loretto.

RECAPITULATION, in oratory, &c. a part of the peroration. See the article **PERORATION**.

Recapitulation is a summary, or a concise and transient enumeration of the principal things insisted on in the preceding discourse, whereby the force of the whole is collected into one view.

RECAPTION, in law, the taking a second distress of one formerly distrained for the same cause during the plea grounded upon the former distress. It is also the name of a writ which lies for the party thus distrained, to recover damages, &c.

RECEIPT, or **RECEIT**, in commerce, an acquittance, or discharge, in writing, intimating that the party has received a certain sum of money, either in full for the whole debt, or in part, or on account.

RECEIPT, in book-keeping, is an account of all the money and goods received. See the article **BOOK**.

RECEIPT, or **RESCUIT**, in law. See the article **RESCUIT**.

RECEIPT of the exchequer. See the article **EXCHEQUER**.

RECEIPT, in medicine. See **RECIPE**.

Auditor of the RECEIPTS. See the article **AUDITOR**.

RECEIVER, in chemistry, a vessel of earth, glass, &c. for receiving any distilled liquor.

RECEIVER, in pneumatics, a glass-vessel for containing the thing on which an experiment in the air-pump is to be made. See **AIR-PUMP**, **EXHAUSTED**, &c.

There are several sorts of glass-receivers; As A (plate CCXXXVIII. fig. 3. n^o 1.) open at top, covered with a brass-plate, and oiled leather, at D, and kept down by the cross piece EF, screwed down upon the pillars B, C, which are screwed into the table of the air-pump. See the articles **AIR** and **PUMP**.

H (*ib.* n^o 2.) is a receiver open at top, with a plate and collar of wet leathers K, through which goes the slip-wire G I, so tight as to let in no air: this wire serves to lift any thing by its hook.

M (*ib.* n^o 3.) is a transferrer, or receiver, that may be taken off from the pump, in an exhausted state; N being a plate and leather, on which stands the receiver M, close at top; and O, a cock, to open or shut the passage. Now, the cock being open, and the air exhausted by the pump, if the cock be shut, the receiver and pipe may be taken away from the air-pump, the vacuum remaining in M.

Mr. Boyle observes, that a very small crack in the receiver, used in pneumatical experiments, does not render them useless; for upon evacuating the internal air, the external pressing the glass on all sides, brings the edges of the glass close together. But in case of considerable flaws a plaster may be applied, made of quick-lime, finely powdered, and nimbly ground, with a proper quantity of the scrapings of cheese, and water enough to bring the mixture to a soft paste; which, when the ingredients are well incorporated, will have a strong and fetid scent; and then it must be immediately spread upon a linen-cloth, and applied, lest it begin to harden.

RECEIVER, *receptor* or *receptator*, in law, is commonly understood in a bad sense, and used for such as knowingly receive stolen goods from thieves, and conceal them. This crime is felony, and the punishment is transportation for fourteen years.

RECEIVER

RECEIVER also signifies an officer; of which there are several kinds, denominated from the particular matters they receive, the places where, or the persons from whom, &c. 1. Receiver of the fines is an officer appointed to receive the money of such persons as compound with the king, upon original writs sued out of chancery. 2. Receiver general of the dutchy of Lancaster is an officer belonging to the dutchy-court, who collects all the revenues, fines, forfeitures, and assessments within that dutchy. 3. Receiver general of the public revenue, is an officer appointed in every county, to receive the taxes granted by parliament, and remit the money the treasury.

RECEPTACULUM CHYLI, or **PEQUET'S RESERVATORY**, the reservoir or receptacle for the chyle, situated in the left side of the upper vertebra of the loins, under the aorta, and the vessels of the left kidney. See **CHYLIFICATION** and **THORACIC DUCT**.

RECEPTACULUM SEMINUM, **RECEPTACLE OF THE SEED**, a term used by botanists, for the base, or thalamus, which supports the seeds: the disc of this part is either flat, concave, convex, globular, or pyramidal; and its surface is sometimes naked, and sometimes paleaceous.

RECESSUS IMPERII, or **RECESS of the empire**, signifies a collection of the determinations of a diet of the german empire. See **DIET** and **EMPIRE**.

RECHABITES, a kind of religious order among the antient Jews, instituted by Joadab, the son of Rechab, comprehending only his own family and posterity. Their founder prescribed them three things: first, not to drink any wine; secondly, not to build any houses, but to dwell in tents; and thirdly, not to sow any corn, or plant vines. These rules the rechabites observed with great strictness.

RECHACING, in hunting, driving back the deer, or other beasts, into the forests, chaces, &c. from whence they had strayed.

RECHANGE, or **RE-EXCHANGE**. See the articles **RE-EXCHANGE**.

At sea they use the term **rechange** for a tackle kept in reserve, in case that already in use should fail. See **TACKLE**.

RECHARGE, a second charge or loading of a fire-arm.

The recharge should never be so deep as the first charge, lest the piece, being overheated, should burst.

RECHEAT, in hunting, a lesson which the huntsmen play on the horn, when the hounds have lost their game, to call them back from pursuing a counter-scent.

RECIPE, in medicine, a prescription or remedy, to be taken by a patient; so called because always beginning with the word *recipe*, i. e. *take*; which is generally denoted by the abbreviation **R**. For the rules proper to be observed in forming recipes, see **PRESCRIPTION**.

RECIPIANGLE, or **RECIPIENT ANGLE**, a mathematical instrument, serving to measure re-entering and salient angles, especially in fortification.

It usually consists of two arms, or rulers, **A C**, and **B C** (plate **CCXXVIII**. fig. 4. n° 1.) rivetted together at **C**, and capable of being opened and closed, like a sector. To take an angle with it, they lay the center of a protractor over the joint **C**, and apply its diameter to one of the rulers; then the degrees cut by the edge of the other ruler, shew the quantity of the angle.

There are other forms of this instrument; that represented *ibid*. n° 2. has a graduated circle, by which the angles may be readily measured by its index: and n° 3. *ibid*. is another kind composed of four equal rulers of brass, rivetted together by their ends, so as to form a parallelogram; and on one of the rulers is fixed a graduated semi-circle, which measures the opposite angle of the parallelogram, by means of one of the rulers produced, so as to serve instead of an index.

RECIPIENT, the same with receiver. See the article **RECEIVER**.

RECIPROCAL, in general, something that is mutual, or which is returned equally on both sides, or that affects both parties alike.

There are reciprocal duties between the prince and his subjects, between the husband and wife, &c. also in a physical sense, the action between the agent and patient is reciprocal: that is, the patient re-acts as much upon the agent, as this acts upon it. See **RE-ACTION**.

RECIPROCAL TERMS, among logicians, are those which have the same signification; and consequently are convertible, or may be used for each other.

RECIPROCAL VERSES, in grammar, are those which express an action that is reflected upon the agent or agents, as,

Ces quatre hommes s'entrebattoient.

These four men fought together.

Reciprocal verses, in poetry, are such as

run the same both forwards and backwards.

RECIPROCAL FIGURES, in geometry, those which have the antecedents and consequents of the same ratio, in both figures. Thus, in plate CCXXIX. fig. 4. the side $A : B :: C : D$; or $12 : 4 :: 9 : 3$; that is, as much as the side A , in the first rectangle, is longer than B , so much deeper is the side C , in the second rectangle, that the side D in the first; and, consequently the greater length of the one is compensated by the greater breadth or depth of the other; for as the side A is $\frac{1}{2}$ longer than C , so B is $\frac{1}{2}$ longer than D , and the rectangles of course equal; that is, $A \times D = B \times C$, or $12 \times 3 = 4 \times 9 = 36$.

This is the foundation of that capital theorem, *viz.* that the rectangle of the extremes is always equal to that of the means; and, consequently, the reason of the rule of three. See **RULE**.

Hence it follows, that in any two triangles, parallelograms, prisms, parallelipeds, pyramids, cones, or cylinders have their bases and altitudes reciprocally proportional, those two figures or solids are equal to each other; and *vice versa*, if they are equal, then their bases and altitudes are reciprocally proportional. See **TRIANGLE**, **PARALLELOGRAM**, &c.

RECIPROCAL PROPORTION, in arithmetic, is when, in four numbers, the fourth is less than the second, by so much as the third is greater than the first; and *vice versa*. See the article **PROPORTION**. This is the foundation of the inverse, or indirect rule of three: thus, $4 : 10 :: 8 : 5$. See the article **RULE**.

Reciprocal proportion is of great use in determining the laws of motion. See the article **MOTION**.

RECITATIVO, or **RECITATIVE**, in music, a kind of singing, that differs but little from ordinary pronunciation, such as that in which the several parts of the liturgy are rehearsed in cathedrals; or that wherein the actors commonly deliver themselves on the theatre at the opera, when they are to express some action or passion, to relate some event, or reveal some design.

Notwithstanding this sort of composition is noted in true time, the performer is at liberty to alter the bars of measure, and make some long and others short, as his subject requires: hence the thorough bass to the recitative is usually placed below the other, to the end that he, who is to

accompany the voice, may rather observe and follow the finger, than the person that beats the time.

RECKONING, or a *Ship's RECKONING*, in navigation, is that account, whereby at any time it may be known where the ship is, and on what course or courses she is to steer, in order to gain her port; and that account taken from the log-board is called the dead reckoning. See **LOG-BEARD**, **JOURNAL**, &c.

But as the ship's motion is liable to be disturbed from a variety of causes, such as the lee-way, variation of the compass, currents, unsteadiness of the winds, &c. her place, according to the dead reckoning, may be justly doubted; and therefore mariners try every way to find the latitude their ship is in, by observations of the sun or stars. See the articles **LEE-WAY**, **VARIATION**, **CURRENT**, **WIND**, and **LATITUDE**.

Now, if the latitude found by observation, and that found by the dead reckoning, agree, it is presumed the ship's place is well determined; but if they disagree, the account of longitude must be corrected: and for the latitude, that found by observation is always to be depended on.

In correcting the longitude found by the dead-reckoning, consider whether the difference may not have been occasioned by a current; and, if possible, make an estimate of it, as directed under the article **CURRENT**.

The business of correcting the dead-reckoning is a very precarious operation, and at best is little more than guessing; since there may be unknown currents, occasioned by trade-winds, the tides following the moon, stormy weather, &c. hence the best mariners are not able to pronounce with certainty, whether the ship may not be to the eastward or westward of the point wherein the dead-reckoning places her.

However, the following methods are those usually taken to discover her true place:

1. If the difference of latitude be much more than the departure, or the direct course has been within three points of the meridian, then the error is most likely in the distance run. 2. If the departure is much greater than the difference of latitude, or the direct course is within three points of the parallel, or more than five points from the meridian; the error may be ascribed to the course. 3. But if the courses are, in general, near the middle of

of the quadrant, the error may be either in the course, or in the distance, or in both. For to cause an alteration in the difference of latitude, the first of these cases requires a greater error in the course, than can well be supposed to have been committed: in the second case, the distances must be so faulty, as would scarce escape observation; and, in the third case, it is often doubtful, whether to attribute the error to the course or distance; and therefore it is usually corrected in both.

As for the methods of correcting the dead-reckoning by the variation-chart, and by actually finding the ship's true longitude from celestial observations, see VARIATION and LONGITUDE.

RECLAIMING, or **RECLAMING**, in our ancient customs, a lord's pursuing, prosecuting, and recalling his vassal, who had gone to live in another place without his permission.

Reclaiming is also used for the demanding of a person, or thing, to be delivered up to the prince or state to which it properly belongs; when, by any irregular means, it is come into another's possession.

RECLAIMING, in falconry, is taming a hawk, &c. and making her gentle and familiar.

A partridge is said to reclaim, when she calls her young ones together, upon their scattering too much from her.

RECLINATION, of a plane, in dialling, the number of degrees, which a dial-plane leans backwards, from an exactly upright or vertical plane, that is, from the zenith.

The reclination is easily found by means of a ruler, and a quadrant; for having drawn an horizontal line on the plane by a level, or quadrant, and to it another line at right angles; apply a ruler, so that one end of it may hang over, or reach beyond the plane: there will a quadrant, applied to the under edge of the ruler, shew the degrees and minutes of the plane's reclination; accounting from that side of the quadrant, that is contiguous to the edge of the ruler.

RECLINER, or **RECLINING DIAL**. See **DIAL** and **RECLINATION**.

RECLUSE, among the papists, a person shut up in a small cell of an hermitage, or monastery, and cut off, not only from all conversation with the world, but even with the house. This is a kind of vo-

luntary imprisonment, from a motive either of devotion or penance.

The word is also applied to incontinent wives, whom their husbands procure to be thus kept in perpetual imprisonment in some religious house.

Recluses were antiently very numerous: they took an oath, never to stir out of their retreat; and having entered it, the bishop set his seal upon the door; and the recluse was to have every thing necessary for the support of life, conveyed to him through a window. If he was a priest, he was allowed a small oratory, with a window, which looked into the church, through which he was to make his offerings at the mass, hear the singing, and answer those who spoke to him; but this window had curtains before it, so that he could not be seen. He was allowed a little garden, adjoining to his cell, in which he might plant a few herbs, and breathe a little fresh air. If he had disciples, their cells were contiguous to his, with only a window of communication, through which they conveyed necessities to him, and received his instructions. If a recluse fell sick, his door might be opened for persons to come in and assist him, but he himself was not to stir out.

F. Helyot gives a particular account of the ceremonies practised in the reclusion of a woman, in that of mother de Cambray, in the year 1625. The bishop waited for her, early in the morning at the church-door; and upon her arrival and prostrating herself at the feet of that prelate, he gave her his benediction; conducted her to the grand altar, and there blessed a mantle, veil, and scapular, put them on her and gave her a new name. Having here made her vow, and the bishop having harangued the people in praise of the new recluse, he conducted her processionally to her reclusion; the clergy all the way singing, *Veni, sponsa Christi*, &c. Here the bishop, blessing her afresh, consecrated the reclusion, and shut her up in perpetual confinement.

RECOGNITION, in law, an acknowledgement; a word particularly used in our law-books, for the first chapter of the statute 1 Jac. I. by which the parliament acknowledged, that, after the death of queen Elizabeth, the crown had rightfully descended to king James.

RECOGNITIONE ADNULLANDA PER VIM, ET DURITIEM FACTA, in law, is a writ that

that issues to the justices of the common pleas, for sending a record of a recognizance, which the recognizor suggests to have been acknowledged by force and hard dealing; in order that if it so appear, it may be annulled.

RECOGNIZANCE, or **RECOGNISANCE**, in law, a bond or obligation of record, acknowledged to the king; thus called, because recognized or acknowledged in some court of record, or before some judge, master in chancery, or justice of the peace.

There are recognizances as well for debt, as of bail, for good behaviour, and for appearance to prosecute felons, &c. which last kinds, acknowledged before justices of the peace, are by them to be returned to the sessions, otherwise an information lies against them.

In recognizances for bail, &c. before a justice, the principal is bound in double the sum of the sureties, the usual number of whom are two, and the penalty is 40*l.* at least. Mere recognizances are not sealed, but enrolled; and execution, by force thereof, is of all the recognizor's goods or chattels (except draught-horses and implements of husbandry) and the moiety of his land. The execution upon a recognizance, is termed an extent. See the article **EXTENT**.

The party bound in a recognizance, is called recognizor; and the person to whom he is bound, is termed the recognizee.

Recognizance is also used in our antient statutes, for the verdict of the twelve jurors upon an assize; hence called recognitors.

RECOIL, or **REBOUND**, the starting backward of a fire-arm, after an explosion. Merfennus tells us, that a cannon 12 feet in length, weighing 6400 lb. gives a ball of 24 lb. an uniform velocity of 640 feet per second. Putting, therefore, $W = 6400$, $w = 24$, $V = 640$, and $v =$ the velocity with which the cannon recoils; we shall have (because the momentums of the cannon and ball are equal) $Wv = wV$; and so $v = \frac{wV}{W} = \frac{24 \times 64}{6400} = 2$, 4; that is, it would recoil at the rate of $2\frac{4}{10}$ feet per second, if free to move. See **GUNNERY** and **PROJECTILES**.

RECOLLECTION, a mode of thinking, by which ideas sought after by the mind, are found, and brought again to view.

RECOLLECTS, a congregation of reformed franciscans, called also friers-minors of St. Francis, of the strict observance. See **FRANCISCAN MONKS**.

RECONCILIARI, in our law-books, &c.

A church is said reconciliari, to be reconciled, when it is consecrated afresh, after having been polluted or prophaned, as by being in the possession of pagans, heretics, &c.

RECONNOITRE, in war, to view and examine the state and situation of things.

RECORD, an authentic testimony in writing, contained in rolls of parchment, and preserved in a court of record.

Records are said to be of three kinds, viz. a record judicial, an attainer, &c. a record ministerial, upon oath, as an office or inquisition found; and a record made by conveyance and consent, as a fine, &c.

RECORD, among fowlers, is a bird's beginning to tune or sing, as it were within itself; or to perform its notes and dispose its organs for singing. The cock-thrush is distinguished from the hen in recording, the first being more loud and frequent in it than the second.

RECORDARE FACIAS, a writ directed to the sheriff, to remove a cause out of an inferior court, into the king's bench or common pleas.

RECORDER, a person whom the mayor and other magistrates of a city or corporation associate to them, for their better direction in matters of justice, and proceedings in law; on which account this person is generally a counsellor, or other person well skilled in the law.

The recorder of London is chosen by the lord mayor and aldermen; and, as he is held to be the mouth of the city, he delivers the judgment of the courts therein and records and certifies the city customs.

RECORDO ET PROCESSO MITTENDIS, is a writ to call a record, together with the whole proceedings in a cause, out of an inferior court into the king's court.

RECOVERY, in law, is obtaining any thing by judgment or trial at law.

Recoveries are of two kinds, a true recovery and a feigned or common one. A true recovery is the actual recovering of any thing, or its value, by judgment and trial at law: as where a person is sued for land, or other things real and personal, and obtains a verdict in his favour. A feigned or common recovery, is a formal act by consent, made use of for the better securing of lands, tenements, &c. the end and effect of which is, to dock and destroy estates-tail, remainders, and reversioners,



Fig. 2. RECURVINOSTRA.



Fig. 1. The REDSTART.



Fig. 3. RECTIFICATION of Curves

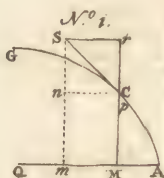
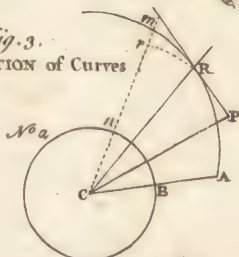
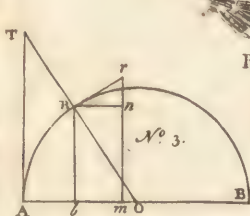


Fig. 4. RECIPROCAL FIGURES.

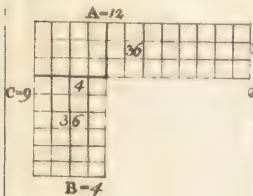


Fig. 5. REEL.



Fig. 6. REMPLY.



N° 2.

N° 1.



Fig. 7. The RED-BREAST Cock and Hen.



reversions, and to bar the former owners. In a common recovery, there must be at least three parties, *viz.* the demandant, tenant, and vouchee: the demandant is the person that brings the writ of entry, and therefore may be termed the recoveror; the tenant is he against whom the writ is brought, who may be termed the recoveree; and the vouchee is the person whom the tenant vouches, or calls to warrant for the lands demanded: thus, when a person is desirous to cut off an estate-tail in lands, &c. he causes a feigned writ of entry *sûr disseisin en le port* to be brought by some friend, who is the demandant, for those lands, &c. who in a feigned declaration thereupon made, pretends that he was disseised by him, who, by a feigned fine, or deed of bargain and sale, is named and supposed to be the tenant of the land: this feigned tenant, if it be a single recovery, is made to appear and vouch to warranty the crier of the court of common pleas, or the baggage-bearer of writs to the *custos brevium* in that court, who is termed the common vouchee, and is supposed to warrant the title; but he making default, a judgment is by this fiction entered, that the demandant shall recover, and have a writ off seisin for the possession of the lands in question; and that the tenants shall recover the value of the lands against the common vouchee: though this recovery in value is only imaginary, yet it is looked upon as a bar to the entail for ever.

REICREMENT, in chemistry, some superfluous matter separated from some other that is useful: in which sense it is the same with *scoria*, *fæces*, and excrements. See the article *SCORIA*, &c.

RECRIMINATION, in law, an accusation brought by the accused against the accuser, upon the same fact. See the article *ACCUSATION*.

RECRUITS, in military affairs, new-raised soldiers, designed to supply the place of those who have lost their lives in the service, or are disabled by age or wounds. (See the article *SOLDIER*.)

RECTANGLE, in geometry, the same with a right-angled parallelogram. See the article *PARALLELOGRAM*.

In arithmetic and algebra, a rectangle signifies the same with *factum* or product. See the articles *PRODUCT* and *MULTIPLICATION*.

RECTANGLED, RECTANGULAR, or RIGHT-ANGLED, appellations given to

figures and solids which have one or more right-angles: thus a triangle with one right angle, is termed a rectangled triangle; also parallelograms with right angles, squares, cubes, &c. are rectangular.

Solids, as cones, cylinders, &c. are also said to be rectangular, with respect to their situation, when their axis are perpendicular to the plane of the horizon.

The antient geometricians always called the parabola, the rectangular section of a cone. See the articles *CONIC SECTIONS* and *PARABOLA*.

RECTIFICATION, the art of setting any thing to rights: and hence, to rectify the globes, is to fit them for performing any problem. See *GLOBE*.

RECTIFICATION, in geometry, is the finding a right line, equal in length to a curve. See the article *CURVE*.

The rectification of curves is a branch of the higher geometry, where the use of the inverse method of fluxions, is very conspicuous.

Case I. Let *A C G* (pl. CCXXIX. fig. 3. n° 1.) be any kind of curve, whose ordinates are parallel to themselves, and perpendicular to the axis *A Q*. Then if the fluxion of the absciss *A M* be denoted by *M m*, or by *C n*, (equal and parallel to *M m*) and *n S*, equal and parallel to *C r*, be the representation of the corresponding fluxion of the ordinate *M C*; then will the diagonal *CS*, touching the curve in *C*, be the line which the generating point *p*, would describe, were its motion to become uniform at *C*; which line, therefore, truly expresses the fluxion of the space *A C*, gone over. See the article *FLUXION*.

Hence, putting *A M = x*, *CM = y*, and *AC = z*; we have $z (= CS = \sqrt{C n^2 + S n^2} = \sqrt{x^2 + y^2})$; from which, and the equation of the curve, the value of *z* may be determined. Thus, let the curve proposed be a parabola of any kind, the general equation for

which is $x = \frac{y^n}{a^{n-1}}$; and hence $\dot{x} =$

$\frac{n y^{n-1} \dot{y}}{a^{n-1}}$, and therefore $(\dot{z} \sqrt{y^2 + x^2}) =$

$$\sqrt{y^2 + \frac{n^2 y^{2n-2} \dot{y}^2}{a^{2n-2}}} = \dot{y} \times 1 + \frac{n^2 y^{2n-2}}{a^{2n-2}};^{\frac{1}{2}}$$

the

The fluent of which, universally expressed

in an infinite series, is $y + \frac{n^2 y^{2n-1}}{2n-1 \times 2a^{2n-2}}$

$$\frac{n^4 y^{4n-3}}{4n-3 \times 8a^{4n-4}} + \frac{n^6 y^{6n-5}}{6n-5 \times 16a^{6n-6}}$$

&c = \dot{z} .

Case II. Let all the ordinates of the proposed curve ARM (*ibid.* n^o 2.) be referred to a center C: then, putting the tangent RP (intercepted by the perpendicular CP) = t , the arch, BN, of a circle, described about the center C, = x ; and the radius CN (or CB) = a ; we have $\dot{z} : \dot{y} :: y (CR) : t (RP)$; and, consequently, $\dot{z} = \frac{y \dot{y}}{t}$; from whence the value of \dot{z} may be found, if the relation of y and t is given. But, in other cases, it will be better to work from the following equation, *viz.* $\dot{z} = \sqrt{\dot{y}^2 + \frac{y^2 \cdot \dot{y}^2}{a^2}}$,

which is thus derived; let the right line CR, be conceived to revolve about the center C; then since the celerity of the generating point R, in a direction perpendicular to CR, is to (\dot{x}) the celerity of the point N, as CR (y) to CN (a), it will therefore be truly represented by $\frac{y \dot{x}}{a}$; which being to (\dot{y}) the celerity in the direction of CR, produced as CB (s) : RP (t), it follows that $\frac{y^2 \dot{x}}{a^2} : \dot{y}^2 :: s^2 : t^2$; whence, by composition, $\frac{y^2 \dot{x}^2}{a^2} + \dot{y}^2 : \dot{y}^2 :: s^2 + t^2 (y^2) : t^2$; therefore $\frac{y^2 \dot{x}^2}{a^2} + \dot{y}^2 = \frac{y^2 \dot{y}^2}{t^2}$, and consequently $\sqrt{\frac{y^2 \dot{x}^2}{a^2} + \dot{y}^2} (= \frac{y \dot{y}}{t}) = \dot{z}$. Q. E. D.

But the same conclusion may be more easily deduced from the increments of the flowing quantities: for, if Rm , rm , and Nu be assumed to represent (\dot{x} , y , \dot{x}) any very small corresponding increments of AR, CR, and BN; then will CN (a) : CR (y) :: \dot{x} (the arch Nn) : the similar arch $Rr = \frac{y \dot{x}}{a}$. And if the triangle Rrm (which, while the point m is returning back to R, approaches continually nearer and nearer to a similitude with CRP) be considered as rectilinear, we shall also obtain $\dot{z}^2 (=$

$$Rm^2 = Rr^2 + rm^2) = \frac{y^2 \dot{x}^2}{a^2} + \dot{y}^2; \text{ and}$$

$$\sqrt{\frac{y^2 \dot{x}^2}{a^2} + \dot{y}^2} (= \frac{y \dot{y}}{a}) = \dot{z}, \text{ as before.}$$

Now from the right sine, versed sine, tangent, or secant of an arch of a circle OARB (*ibid.* n^o 3.) given: to find the length of the arch itself, in terms thereof. Put the versed sine AB = x , the right sine Rb = y , the tangent AT = t , the secant OT = s , the arch AR = z , and the radius AO, or RO = a ; also let $Rn = \dot{x}$, $nr = \dot{y}$, and $Rr = \dot{z}$; then, since $\angle rRn$ (= a right angle) = $\angle O b R$, and $rRn = ORb$, the triangles rRn , and ORb , are equiangular; and $Rb(\dot{y})$:

$$OR(a) :: Rn(\dot{x}) : Rr(\dot{z}) = \frac{ax}{\sqrt{2ax - xx}};$$

because, by the property of the circle, $y = \sqrt{2ax - xx}$. Also, $Ob(\sqrt{a^2 - y^2})$:

$$: OR(a) :: nr(\dot{y}) : Rr(\dot{z}) = \frac{ay}{\sqrt{a^2 - y^2}}.$$

These two values exhibit the fluxion of the arch, in terms of the versed sine and right sine, respectively: and to get the same in terms of the tangent and secant, we have OT ($s = \sqrt{a^2 + t^2}$) : OA (a)

$$:: OR(a) : Ob = \frac{a^2}{s} = \frac{a^2}{\sqrt{a^2 + t^2}}. \text{ Hence}$$

$$Ab = a - \frac{a^2}{s} = a - \frac{a^2}{\sqrt{a^2 + t^2}}, \text{ whose flu-}$$

$$\text{xion} = \frac{a^2 \dot{s}}{s^2} = \frac{a^2 + t \dot{t}}{a^2 + t^2}^{\frac{3}{2}}; \text{ whence AT}$$

$$(= \sqrt{s^2 - a^2} = t) : OT (= s = \sqrt{a^2 + t^2})$$

$$:: Rn : Rr = \frac{a^2 \dot{s}}{s \sqrt{s^2 - a^2}} = \frac{a^2 \dot{t}}{a^2 + t^2} = \dot{z}.$$

Now from any one of these forms of fluxions, *viz.* $\frac{ax}{\sqrt{2ax - xx}}$, $\frac{ay}{\sqrt{a^2 - y^2}}$,

$$\frac{a^2 \dot{t}}{a^2 + t^2}, \text{ and } \frac{a^2 \dot{s}}{s \sqrt{s^2 - a^2}}, \text{ the value of}$$

the arch itself (by taking the fluent in an infinite series) may be found. But the third form, expressed in terms of the tangent, being entirely free from radical quantities, will be the most ready in practice, especially where the required arch is but small, though the series, arising from the first form, always converges fastest.

If, therefore, $\frac{a \dot{t}}{a^2 + t^2}$ be converted into

an infinite series, we shall have $z = t -$

$$\frac{t^2}{a^2} + \frac{t^4}{a^4} - \frac{t^6}{a^6} +, \&c. \text{ and conse-}$$

$$\text{quently, } z = t - \frac{t^3}{3a^2} + \frac{t^5}{5a^4} - \frac{t^7}{7a^6} + \frac{t^9}{9a^8}$$

$-\&c. = AR$. Now if, for example, we suppose $AR = 30^\circ$, and AO (to render the operation more easy) = unity,

we shall have $t = \sqrt{\frac{1}{3}} = .5773502$; because $Ob(\sqrt{\frac{1}{3}}) : bR(\frac{1}{2}) :: OA(1) :$

$AT(t) = \frac{1}{3}$. Whence $t^3 = .1924500$,

$t^5 = .0641500$, $t^7 = .0213813$, $t^9 = .0071277$, $\&c.$ And therefore $AR =$

$$.5773502 - \frac{.1924500}{3} + \frac{.0641500}{5} -$$

$$\frac{.0213813}{7} + \frac{.0071277}{9} - \&c. = .5235987;$$

which, multiplied by 6, gives 3.141592 , $\&c.$ for the length of the semi-periphery of a circle whose radius is 1.

RECTIFICATION, in chemistry, is nothing but the repetition of a distillation, or sublimation several times, in order to render the substance purer, finer, and freer from aqueous or earthy parts.

The perfection of rectifying spirits, according to Dr. Shaw, depends upon finding out a simple method of separating all the oil and water from it; and, he observes, that the great affinity betwixt the essential oil and spirit, is the physical cause of the difficulty found in the rectification of brandies. He recommends the way of working from a spirit largely diluted with water, into water again; whereby the essential oil would, at one operation, be doubly separated. See the articles **DISTILLATION**, **ALCOHOL**, **SPIRIT**, $\&c.$

RECTIFIER, in navigation, an instrument consisting of two parts, which are two circles either laid one upon, or let into, the other, and so fastened together in their centers, that they represent two compasses, one fixed, the other moveable; each of them divided into the thirty-two points of the compass, and three hundred and sixty degrees, and numbered both ways, from the north and the south, ending at the east and west, in ninety degrees.

The fixed compass represents the horizon, in which the north and all the other points of the compass are fixed and immoveable. See **HORIZON**.

The moveable compass represents the mariners compass, in which the north

and all other points are liable to variation. See **COMPASS**.

In the center of the moveable compass is fastened a silk thread, long enough to reach the outside of the fixed compass. But, if the instrument be made of wood, there is an index instead of the thread.

Its use is to find the variation of the compass, to rectify the course at sea; having the amplitude or azimuth given.

RECTIFIER, in the distillery, the person whose employment it is to take the coarse malt-spirit of the malt-stiller, and redistil it to a finer and better liquor. The art of the rectifier, according to Dr. Shaw, might be entirely set aside, if the malt-stiller could make his spirit perfect at the second operation; which seems very practicable, if the malt-stillers could be got to forsake their old track. The great things to be recommended for the improvement of their art, would be first the brewing in perfection, and secondly the keeping their wash after the manner of stale beer, till it has entirely lost its malt-flavour, and acquired a pungent, acid vinosity; and then, thirdly, leaving out the lees, to distil with a well regulated fire. It is scarce to be thought how pure a spirit is to be obtained from malt this way: but the great art would be, the finding a way to make malt-liquors artificially stale, bright, and flavourless, though otherwise vinous.

RECTIFYING the globe. See **GLOBE**.

RECTILINEAR, in geometry, right-lined; thus figures whose perimeter consists of right lines, are said to be rectilinear.

RECTITUDE, *rectitudo*, in philosophy, refers either to the act of judging or of willing; and therefore whatever comes under the denomination of rectitude is either what is true or what is good; these being the only objects about which the mind exercises its two faculties of judging and willing.

Moral rectitude, or uprightness, is the chusing and pursuing those things which the mind, upon due enquiry and attention, clearly perceives to be good; and avoiding those that are evil.

RECTO, in law, usually termed a writ of right, is of so high a nature, that while other writs in real actions are only for the recovery of the possession of the lands, $\&c.$ in question, this writ tends to recover both the seisin and the property; by which means both the rights of

possession and property are tried together. There are two kinds of this writ, viz. a writ of right patent, so called because it is sent open; it lies for him that has the fee simple in the lands, &c. sued for, against a tenant of the freehold at least: the other is a writ of right-close, and lies where a person holds lands or tenements by charter in antient demesne, in fee-simple, fee-tail, for term of life, or in dower, and is disseised. This writ is directed to the king's manors, or to the lord of an antient demesne, commanding him to do right in his court.

Recto, or right, is also prefixed to the title of several other writs: as 1. *Recto de advocacione ecclesie*, which is a writ of right that lies where a person has right of advowson in fee to him and his heirs; and the incumbent dying, a stranger presents his clerk to the church; and he, not having brought this action of *quare impedit*, &c. within six months, has suffered the stranger to usurp upon him. 2. *Recto de dote*, a writ of right of dower, which lies for a woman who has received part of her dower, and demands the remainder against the heir of her deceased husband, or his guardian. 3. *Recto de dote unde nihil habet*, a writ of right that lies where a husband having lands or tenements, has assigned a dower thereof to his wife, on which account she is driven to sue the heir, or his guardian, for her thirds. 4. *Recto quando dominus remisit*, is a writ of right which lies where lands, &c. in the signory of any lord, are demanded by a writ of right. Thus if the lord hold no court, or, at the prayer of the demandant or tenant, send his writ to the king's court, to carry the cause thither, this writ issues for the other party. 5. *Recto de rationali parte*, a writ of right patent, that lies between privies in blood; as brothers in gavel-kind, sisters, or other coparteners for land in fee-simple, demanding a certain portion of it to hold in severalty. 6. *Recto sur disclaimer*, a writ which lies where a lord, in the court of common pleas, avows upon his tenant, and the tenant disclaims to hold of him; upon which the lord may bring this writ.

RECTOR, a term applied to several persons whose offices are very different: as, 1. The rector of a parish is a clergyman that has the charge and cure of a parish, and possesses all the tythes,

&c. 2. The same name is also given to the chief elective officer in several foreign universities, particularly in that of Paris. 3. Rector is also used in several convents for the superior officer who governs the house; and the jesuits give this name to the superiors of such of their houses as are either seminaries or colleges.

RECTORY, a parish-church, parsonage, or spiritual living, with all its rights, tythes and glebes.

Rectory is also sometimes used for the rector's mansion or parsonage-house.

RECTUM, in anatomy, the third and last of the large intestines, or guts. See the article *INTESTINES*.

The rectum is in length about three hands breadth, and its diameter about three fingers. It has its beginning at the lowest vertebra of the loins, and at the lower end is the anus. See *ANUS*.

It is connected to the os sacrum, the os coccygis, and the urinary bladder in men; but in women to the vagina uteri. The coats of the rectum are more thick and fleshy than those of any other of the intestines: it has in general no valves, but it has several rugæ: the absence of valves here, is to prevent the expulsion of the fæces from being retarded.

RECTUS, in anatomy, a name common to several pair of muscles, so called on account of the straightness of their fibres, as, 1. The rectus major anticus, which arises from the transverse apophyses of the five lower vertebrae of the neck, and is inserted in the os occipitis. 2. The rectus minor anticus, called, by Cowper, *musculus annuens*; this arises from the anterior surface of the atlas, or first vertebra of the neck; and lies concealed, as it were, under the former, till it is at length inserted a little behind it, into the os occipitis: these two pair of muscles serve to move the head forward. 3. The rectus major posticus, one of the extensors of the head, which has its origin from the spinose apophysis of the epistrophæus, and is inserted into the os occipitis. 4. The rectus minor posticus, which is also one of the five extensors of the head, has its rise from the posterior part of the atlas, and its end under the former. 5. The rectus lateralis, which serves to bend the head on one side, has its origin from the upper surface of the transverse apophysis of the atlas: from this it ascends straight with a short body, but considerably thick; and is inserted partly into the os occi-

occipitis, and partly into the temporal bone, near the incisure of the mastoid process. 6. The rectus tibiae, one of the four extensors of the leg, which has its origin from the anterior and inferior spine of the ileum.

RECTUS IN CURIA, in law, one who stands at the bar, and no man objects any thing against him. So also when a person who has been outlawed has reversed the outlawry, and can partake of the benefit of the law, he is said to be rectus in curia.

RECURRENTS, in anatomy, a name given to several large branches of nerves sent out by the par vagum from the upper part of the thorax to the larynx. See the article NERVES.

RECURRENT VERSES, are the same with those called reciprocal. See the article RECIPROCAL.

RECURVIROSTRA, in ornithology, a genus of the scolopaces order of birds, the beak of which is of a depressed or flattened figure, and is pointed at the extremity and bent upwards: it is about the size of our common lapwing, or a little larger; its colour is variegated, black and white; the figure of its beak is extremely singular, being long, black throughout, flattened, and appears to be of a coraceous substance rather than of a horny one, like that of the beaks of other birds; and its bending upwards in a part of a circle is also singular. See plate CCXXIX. fig. 2.

There is another species common in England, with a yellow breast, about the size of the common pigeon.

RECUSANTS, such persons as acknowledge the pope to be the supreme head of the church, and refuse to acknowledge the king's supremacy; who are hence called popish recusants. These are in England charged with double taxes, not merely as romanists but as recusants.

RECUSATION, the desiring a judge to refrain from judging in a certain cause, on account of his kinship, capital enmity, &c. to one of the parties.

By the french law, kinship within the fourth degree, whether of consanguinity or alliance, is deemed a legal cause of recusation; as also the judge's being god-father, &c. of one of the parties.

RED, in physics, one of the simple or primary colours of natural bodies, or rather of the rays of light. See the articles COLOUR, LIGHT, and RAY.

The red rays are those which of all others

are the least refrangible: hence, as Sir Isaac Newton supposes, the different degrees of refrangibility arise from the different magnitudes of the luminous particles whereof the rays consist, the red rays, or red light, is concluded to be that which consists of the largest particles. Authors distinguish three general kinds of red: one bordering on the blue, as columbine, or dove-colour, purple, and crimson. Another bordering on yellow, as flame colour and orange; and between these extremes is a medium, partaking neither of the one nor the other, which is what we properly call red. Mr. Boyle observes that red is an obvious, and generally a pleasing colour; and that antiently it was customary to present red objects to elephants, to render them more fierce; and that the same colour irritates turkey-cocks. He observes also, that among the several changes of colour which bodies acquire, or disclose, by digestion, it is very remarkable to find a redness rather than any other colour in most tinctures; and even in the more gross solutions made of almost all concretes that abound either with mineral or vegetable sulphur, though the menstruum employed about these solutions or tinctures be never so limpid.

RED, in dying, is one of the five simple or mother colours; some reckon six kinds or casts of red, viz. scarlet red, crimson-red, madder-red, half-grain-red, lively-orange-red, and scarlet of cochineal: but they may be all reduced to the three following, according to the three principal drugs which give the colours: viz. the kermes, cochineal and madder. See the articles KERMES, COCHINEAL, and MADDER.

For the scarlet and crimson reds, see the articles SCARLET and CRIMSON.

Madder-red is made with madder, to which some add realgar and arsenic; others common salt, or other salts, with wheat-flour; or agaric, with spirit of wine, galls, or turmeric. The half-grain is made with agaric and bran water; half-scarlet-grain, half madder, and sometimes turmeric. As to the lively orange-red, the stuff must be first put in yellow, then in a liquor made of goats-hair, which has been boiled several times with madder, and now dissolved over the fire with certain acids, as urine, tartar, &c.

Besides these reds, which are good and allowed colours, there is also a brazil-red,

red, which is discouraged as fading easily. Of the six good reds only four have particular casts or shades, the madder-red, the crimson-red, the lively-orange-red, and the scarlet of cochineal: the casts or shades of crimson are fresh-colour, peach-colour, carnation-rose-colour, and an apple-tree flower colour; Those of madder are fresh-colour, onion-peel colour, and flame-colour; those of the orange are the same with that of the crimson; scarlet, besides the shades of all the rest, has some peculiar to itself, as cherry-colour, fire-colour, &c.

RED, in painting. For painting in oil-colours, they use a red called cinnabar, or vermillion, and another called Lacca. See the articles CINNABAR and LACCA. In limning and fresco, for a violet-red, instead of lacca they use reddle, a natural earth found in England: for a brown, they use ochre. See the articles REDDLE and OCHRE.

RED in heraldry. See GULES.

RED, in cosmetics, a fucus, or paint, wherewith the ladies enliven their cheeks and lips. There are two kinds of these reds, one in leaves called spanish red; the other a liquor which is an extract of a scarlet dye. See COSMETIC.

RED is an epithet used in the english names of several birds, as the red-game, red-shank, red-start, red-breast, red-wing, &c.

The red-game is a species of the tetrao, common in the mountains of Yorkshire, and some other of the northern counties. It is of the shape of a partridge, but much larger, and of a mixed colour of red and black, and is feathered down to the ends of the toes. See TETRAO.

The red-shank is a species of the tringa, called by authors gallinula erythropus, and callidrys, and is about the size of the common plover. The back is of a greyish or brownish-green, usually spotted with black; its neck grey, and its throat variegated with black and white; the breast is white, with a few loose streaks of black; the wing-feathers are variegated with black, brown, and white; the beak is two fingers breadth long, slender, and shaped like the beak of a woodcock, reddish at the base, and blackish lower down: its legs are of a fine beautiful red, and the hinder toe is very short and small.

The red-start a species of the motacilla, with a black throat and reddish belly, is of the size of a chaffinch, but slenderer

in proportion to its thickness; the head is small, and somewhat depressed; the eyes are large; the beak is slender, oblong, and of a dark colour; the head, the neck, and the beak, are of a bright grey; the anterior part of the head is white; the throat and sides of the head under the eyes are black; the breast is of a reddish colour, as are also the rump and the tail. See plate CCXXIX. fig. 1. The red-breast is also of the species of the motacilla, with the throat and breast reddish; it is of the size of the nightingale; the head is pretty large and rounded; the eyes are bright and small; the beak slender and brown; the head, neck, and back, are of a pale olive-brown, with a tinge of grey; the throat and breast are throughout of a tawny colour, approaching to reddish; the belly is white; the wings and tail of the same brownish colour, as are also the legs and feet. See plate CCXXIX fig. 7. where n^o 1. is the cock, and n^o 2. the hen.

The red-wing is a species of the turdus, with a white breast. It is smaller than the common thrush; the head is small and flattened; the eyes are bright; the iris of a deep hazel; the ears are patulous, and the beak brown, with some admixture of yellow; the head, neck, and back, are of a dusky-grey; the sides and under parts of the wings are of an orange-colour, approaching to red; the breast, belly, and throat, are white; the feet are of a paler colour.

RED-RUSSIA, or **LITTLE-RUSSIA**, a province of Poland, bounded by the province of Polesia; on the north, by Volhinia and Podolia on the east; by the Carpathian mountains, which divide it from Transilvania and Hungary, on the south; and by the province of Little Poland, on the west; being two hundred miles long, and one hundred broad.

RED-SEA separates Asia from Africa.

RED-BOOK of the Exchequer, an antient record or manuscript volume, in the keeping of the king's remembrancer, containing divers miscellany treatises relating to the times before the conquest.

REDDENDUM, in our law, is used substantively for the clause in a lease wherein the rent is reserved to the lessor. The proper place for it is next after the limitation of estate.

REDDIDIT se, in law, is where a person procures bail to action, and the party that is bailed, any time before the return of

of the second scire facias against the bail, renders himself in their discharge: such bail are thereby discharged. On a reddidit se, the defendant's attorney is to give notice of the render to the plaintiff's attorney, and make oath of such notice, &c. Also the bail-piece must be discharged, otherwise the plaintiff may notwithstanding proceed to judgment and execution against the bail; for till that is done there is a record still remains in court against them.

REDDITARIUM, was antiently used for the rental of a manor, or other estate; as was

REDDITARIUS, a renter or tenant.

REDDITION, *redditio*, a surrendering or restoring. In law it also denotes a judicial acknowledgment that a thing in question belongs to the demandant.

REDDLE, a soft, heavy, red marle, of great use in colouring; and being washed and freed from its sand, is often sold by our druggists under the name of bole-armenic. See the article **MARLE**.

REDEEMABLES, are lands, funds, &c. sold with a reservation of the equity of redemption. See **REDEMPTION**.

REDELIVER, in law, the yielding and delivering a thing back, which in case of a robbery, &c. does not purge the offence.

REDEMISED signifies the granting back of lands demised or leased.

REDEMPTION, in law, a faculty or right of re-entering upon lands, &c. that have been sold and assigned, upon reimbursing the purchase money with legal costs. Bargains wherein the faculty, or, as some call it, the equity of redemption is reserved, are only a kind of pignorative contracts. A certain time is limited within which the faculty of redemption shall be exercised, and beyond which it shall not extend.

In our old law writers, redemption denoted some grievous mulct, imposed by way of commutation for the head or life of the delinquent.

REDENS, **REDANS**, or **REDANT**, in fortification, a kind of work indented in form of the teeth of a saw, with salient and re-entering angles, to the end that one part may flank or defend another. It is called saw-work and indented-work. The faces in this flank one another. Redens are frequently used in the fortifying of walls, where it is not necessary to be at the expence of building bastions;

as when they stand on the side of a river, a marsh, the sea, &c.

REDHIBITION, *redhibitio*, in the civil-law, an action allowed a buyer, whereby to annul the sale of some moveable, and oblige the seller to take it back again, upon the buyer's finding it damaged; or that there was some personal cheat, &c. The redhibition, or redhibitory action, has place in several cases in the body of the civil law. If a horse was sold that had the glanders, was broken-winded, or foundered, it was a redhibitory case; and the buyer would be obliged to take him again within nine days.

REDINTEGRATION, *redintegratio*, in the civil law, the act of restoring a person to the enjoyment of a thing whereof he had been illegally dispossessed.

REDINTEGRATION, in chemistry, the restoring of any mixt body or matter, whose form has been destroyed by calcination, corrosion, sublimation, or the like, to its former nature and constitution.

REDISSEISIN, in law, signifies a disseisin made by one who once before was found adjudged to have disseised the same person of his lands and tenements; in which case there lies a special writ called redisseisin. This writ may be brought against the person who committed the first disseisin, and against another that was not a disseisor, in case he be a tenant of the lands; and if after a recovery upon this writ, the party is disseised again, by him who made the first redisseisin, he shall have a new writ, and so every time he is redisseised. On the fact being proved by the sheriff's inquisition, the offender is to be imprisoned, and the land re-seised.

REDOUBT, or **REDOUTE**, *reductus*, in fortification, a small square fort, without any defence but in front, used in trenches, lines of circumvallation, contravallation, and approach, as also for the lodgings of corps de gard, and to defend passages. In marshy grounds, redoubts are frequently made of stone-works, for the security of the neighbourhood; their face consists of from ten to fifteen fathom, the ditch round them from eight to nine feet broad and deep, and their parapets have the same thickness.

REDRESSING, the rectifying or setting any thing strait again.

In a moral sense, to redress grievances is to reform and remove them.

To redress a stag, among hunters, is to put him off his changes.

RED.

REDRUTH, a market-town of Cornwall, situated fifty miles south-west of Launceston.

REDUBBORS, those who buy stolen cloths, &c. and, to the end they may not be known, convert them into some other form, or change the colour, &c.

REDUCE, in chemistry, the same with *reduct*. See the article **REDUCT**.

REDUCE a place, among military men, is to oblige the governor to surrender it to the besiegers by capitulation.

REDUCT, or **REDUIT**, a military term signifying an advantageous piece of ground, entrenched, and separated from the rest of the place, camp, &c. for an army, garrison, &c. to retire to in case of a surprize.

REDUCT, in building, a quirk or little place taken out of a larger to make it more uniform and regular; or for some other convenience, as for a little cabinet a side of a chimney, for alcoves, &c.

REDUCT, or **REDUX**, among chemists, a powder by which calcined metals and minerals are again reduced to their regulus, or pure substance. See **REGULUS**.

REDUCTION, *reductio*, in the schools, a manner of bringing a term or proposition which was before opposite to some other, to be equivalent to it. This is effected by the addition or retrenchment of a negative particle: thus, to reduce this proposition, *no man is an animal*, to be equivalent to its opposite, *every man is an animal*; I drop the negative and say, *man is an animal*. After the like manner might the term, *every man*, be reduced, by adding the negative, and saying, *there is no man*.

Reduction of propositions is used in a more general sense for any expression of one proposition by another proposition equivalent thereto. To a reduction, therefore, there are two propositions required; the reduced, and the reducing, which are considered as the extremes thereof, and to be connected in the reduction, by means of the particle, *that is*, which here has the effect of a copula. As here, *only animals think; that is, animals think, and nothing besides animals thinks*; where the proposition preceding the particle, *that is*, is reduced, and the subject of the reduction; that following reduces the particle, and acts as the predicate of reduction; and the particle, *that is*, acts as a copula, importing not barely that the proposition is expressed by another, but by ano-

ther equivalent one, or, as it were, the same.

REDUCTION of *sylogisms*, is a regular changing or transforming of an imperfect syllogism into a perfect one; or it is a change of a syllogism in respect of form, whereby the necessity of the illation or inference is made more evident. See the article **SYLLOGISM**.

Reduction obtains in syllogisms of the second and third figure, and also in the indirect modes of the first. By it these are all brought to the first. There are two kinds of this reduction; the one direct, or ostensive, performed merely by a conversion of one or both the premises, or by a transposition thereof, as when *camelætres* is reduced to *celarent*. The other indirect, called *per impossibile*, or *ad absurdum*, whereby the person who denies the goodpess or legitimacy of an imperfect syllogism, is reduced to assert or grant something absurd and impossible, or contradictory, to some other thing maintained by him: suppose, *e. gr.* a person, granting the premises of the following syllogism, denies the conclusion. *All fraud is prohibited, but some trading is not prohibited: therefore some trading is not fraud*. We thus proceed against him; if the syllogism is not good, the antecedent is just, but the consequent false; and therefore the contrary of the conclusion must be true. Now I take the contrary of the conclusion, which you thus give, *viz. all trading is fraud*, and of that, with the other premise of the former syllogism, *viz. the major*, which you likewise grant, I make a new syllogism; thus, *all fraud is prohibited; all trading is fraud; therefore all trading is prohibited*. But this proposition, *all trading is prohibited*, and the other, *some trading is prohibited*, which you granted me in the first syllogism, are contradictions.

REDUCTION, in arithmetic, that rule whereby numbers of different denominations are brought into one denomination. Reduction is but the application of multiplication and division. For, first, a higher denomination is brought into a lower one, by multiplying the higher denomination with so many of the lower, as are contained in the higher; still keeping them equivalent in value. This is called reduction descending. Secondly, a lower or inferior denomination is reduced into a higher or superior one, by dividing the lesser one with so many



Fig. 1. REDUCTION.

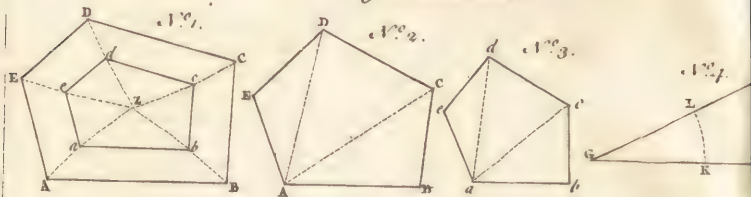
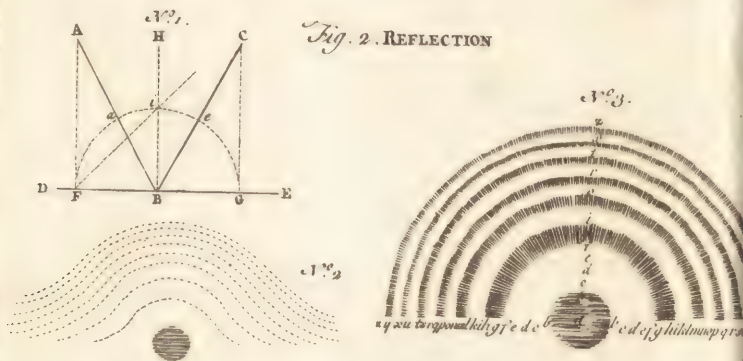


Fig. 2. REFLECTION



N^o 4

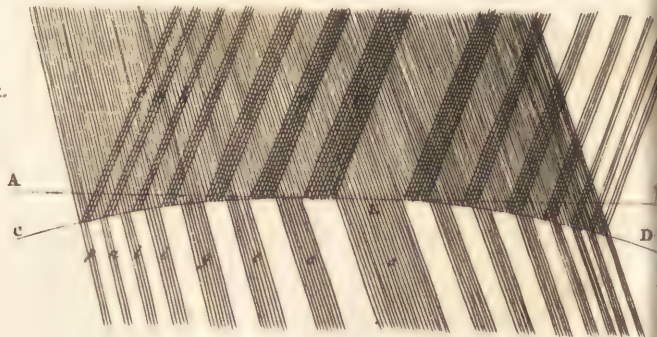
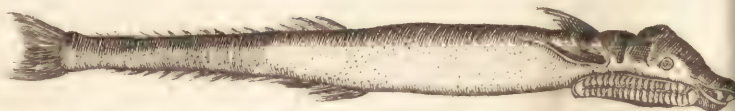


Fig. 3. The REMORA.



many of is denomination as is contained in the greater. This is the converse of the last, and is termed reduction ascending. See the articles MULTIPLICATION and DIVISION.

The reduction of the principal monies, coins, weights, measures, &c. antient and modern, foreign and domestic, may be found under their respective articles MONEY, COIN, WEIGHT, MEASURE, POUND, FOOT, &c.

Thus pounds are reduced into shillings by multiplying with 20; shillings into pence, by multiplying with 12; and pence into farthings, by multiplying with 4. On the other hand, shillings are reduced into pounds, by dividing with 20; pence into shillings, by dividing with 12; and farthings into pence, by dividing with 4.

Examples. Let it be required to reduce 357l. into shillings, and those shillings into pence; $357 \times 20 = 7140 =$ the shillings in 357l. and $7140 \times 12 = 85680 =$ the pence in 357l. as was required. Again, let it be required to reduce 85680d. into shillings, and those shillings into pounds; $85680 \div \text{by } 12 = 7140 =$ the shillings in 357l. and $7140 \div \text{by } 20 = 357 \text{ l.}$ as was required.

If there remain any thing in each division, it is respectively either odd pence, shillings, or farthings; thus 4123788 farthings, being reduced, give 4295l. 12s. 3d.

But when the numbers proposed to be reduced are of several denominations, and it is required to bring them all to the lowest, you must reduce, as before, the highest or greatest denomination to the next less, adding the numbers that are of that next denomination together; then reduce their sum to the next lower denomination; adding together all the numbers that are of that denomination, and so proceed gradually on until all is done.

To expedite the practice of this rule, several compendious ways of reduction have been invented. See PRACTICE.

REDUCTION of fractions. See the article FRACTION.

REDUCTION of equations, in algebra. See the article EQUATION.

REDUCTION of curves. See CURVE.

REDUCTION of a figure, design, or draught, is the making a copy thereof, either larger or smaller than the original; still preserving the form and proportion. The great use of the proportional compasses

is the reduction of figures, &c. whence they are called compasses of reduction. See the article COMPASS.

There are various methods of reducing figures, &c. the most easy is by means of the pentagraph, or parallelogram: but this has its defects. See the article PENTAGRAPH.

The best and most usual methods of reduction are as follows: 1. To reduce a figure, as ABCDE (plate CCXXX. fig. 1. n^o 1.) into a less compass. About the middle of the figure, as z , pitch on a point, and from this point draw lines to its several angles A, B, C, &c. then drawing the line ab parallel to AB, bc parallel to BC, &c. you will have the figure $abcde$ similar to ABCDE.

If the figure $abcde$ had been required to be enlarged, there needed nothing but to produce the lines from the point beyond the angles, as zD , zC , &c. and to draw lines, viz. DC, CB, &c. parallel to the sides dc , cb , &c.

2. To reduce a figure by the angle of proportion, (suppose the figure ABCDE (*ibid.* n^o 2.) required to be diminished in the proportion of the line AB to ab , (*ibid.* n^o 3.) draw the indefinite line GH (*ibid.* n^o 4.) and from G to H set off the line AB. On G describe the arch HI. Set off the line ab as a chord on HI, and draw GI. Then with the angle IGH, you have all the measures of the figure to be drawn. Thus to lay down the point c , take the interval BC, and upon the point G, describe the arch KL. Also on the point G describe MN; and upon A, with the distance MN, describe an arch cutting the preceding one in c , which will determine the side bc . And after the same manner are the other sides and angles to be described. The same process will also serve to enlarge the figure.

3. To reduce a figure by a scale. Measure all the sides of the figure, as ABCDE, (*ibid.* n^o 2.) by a scale, and lay down the same measures respectively from a smaller scale in the proportion required.

4. To reduce a map, design, or figure by squares. Divide the original into little squares, and divide a fresh paper of the dimensions required into the same number of squares, which are to be larger or less than the former, as the map is to be enlarged or diminished. This done in every square of the second figure, draw what you find in its correspondent one in the first.

REDUCTION to the *ecliptic*, in astronomy.

The place of any star reduced to the *ecliptic*, is that point where the secondary passing through the star intersects the *ecliptic*. See the articles **REDUCTION** and **SECONDARY**.

REDUCTION, in metallurgy, is the bringing back metalline substances which have been changed into scoræ or ashes, or otherwise divested of their metallic form, into their natural and original state of metals again. All metals and semi-metals may be reduced by proper management, whatever have been their changes, except only zink, which having been burnt to ashes, admits of no reduction; but the mixture of gold and silver was never yet radically dissolved by any experiment, whatever some may have imagined. Even some earths will turn into metals by the admixture and intimate union of a phlogiston or inflammable principle.

REDUCTION into *first matter*, is a term which alchemists use when they find their substances putrify and grow black.

Reduction is more particularly used for the converting of a dry matter into a liquid, particularly into water, which by the alchemists is held the principle of all things.

REDUCTION, in surgery, denotes an operation whereby a dislocated, luxated, or fractured bone is restored to its former state or place. See the articles **LUXATION** and **FRACTURE**.

REDUIT, in military affairs. See the article **REDUCT**.

REDUNDANCY, or **REDUNDANCE**, a fault in discourse, consisting in the use of a 'superfluity of words.' Words perfectly synonymous are redundant, and ought to be retrenched.

REDUNDANT HYPERBOLA, is a curve of the higher kind, thus called because it exceeds the conic section of that name, in the number of its hyperbolical legs; being a triple hyperbola with six hyperbolical legs. See **HYPERBOLA**, **CURVE**, and **CONIC SECTIONS**.

REDUPLICATION, in rhetoric, a figure whereby a verse begins with the same word as the preceding one ends with. See the article **ANADIPLOSIS**.

REDUPLICATION, in logic, a kind of condition expressed in a proposition indicating or assigning the manner wherein the predicate is attributed to the subject. Hence reduplicative propositions, are such wherein the subject is repeated with some

circumstance or condition. Thus, *men, as men, are rational: kings, as kings, are subject to none but God.*

REE, **REIS**, or **RES**, a little portuguese copper coin. See the article **COIN**.

REED, an antient jewish measure. See the article **MEASURE**.

REED, or the *Common REED*, in botany, *arundo*. See the article **ARUNDO**.

REEF, a term in navigation. When there is a great gale of wind, they commonly roll up part of the sail below, that by this means it may become the narrower, and not draw so much wind; which contracting or taking up the sail they call a reef, or reefing the sail: so also when a top-mast is sprung, as they call it, that is, when it is cracked, or almost broken in the cap, they cut off the lower piece that was near broken off, and setting the other part, now much shorter, in the step again, they call it a reefed top-mast.

REEL, in the manufactories, a machine serving for the office of reeling. There are various kinds of reels, some very simple, others very complex. Of the former kinds those most in use are, 1. A little reel held in the hand, consisting of three pieces of wood, the biggest and longest whereof (which does not exceed a foot and a half in length, and $\frac{1}{2}$ of an inch in diameter) is traversed by two other pieces disposed different ways. 2. The common reel, or windlace, which turns upon a pivot, and has four flights traversed by long pins or sticks, whereon the skain to be reeled is put, and which are drawn closer or opened wider, according to the skain. A representation of the common reel may be seen in plate CCXXIX. fig. 5. where A is the bench or seat of the reel, B the two uprights, C the arms of the reel. Its arbor turning and hitching, its little lantern of four notches in the teeth of the wheel; D two wheels, the upper one of which moves the lower, by means of a pinion. E a hammer, the handle whereof is lowered by a peg at the bottom of the lower wheel. F a cord which is rolled round the axle of the lower wheel, and supports a weight which stops after a certain numbers of turns, to regulate the work-woman.

There are other reels used in particular arts, as the reel used in milling of silk, &c. and those in the reeling and winding of silks. See the article **SILK**.

REELING, in the manufactories, the wind-

winding of thread, silk, cotton, or the like, into a skain, or upon a bottom, to prevent its entangling. It is also used for the charging or discharging of bobbins or quills, to use them in the manufacture of different stuffs, as thread, silk, cotton, &c. Reeling is performed different ways, and on different engines. See the article REEL.

RE-ENTRY, in law, signifies the resumming or retaking that possession which any one had lately forgone; as where a person makes a lease of lands to another, the lessor thereby quits the possession, and if the lessee covenants that upon non-payment of the rent reserved, the lessor may lawfully re-enter, being as much as if it was conditioned for the lessor to take the land again into his hands, and recover the possession again by his own act without the assistance of the law. Likewise, if a lease for years be made, with condition that if the lessee assign his terms, the lessor may re-enter, and the lessee in breach of the condition assigns unknown to the lessor, who accepts of rent from the assignee without notice of the assignment, in that case it is held the lessor may re-enter, notwithstanding his acceptance of the rent.

REEVE of a church, the guardian of it, or the churchwarden. See CHURCH.

REEVING, in the sea-language, the putting a rope through a block: hence to pull a rope out of a block, is called unreeving.

RE-EXCHANGE, in commerce, a second payment of the price of exchange, or rather the price of a new exchange due upon a bill of exchange that comes to be protested and to be refunded the bearer by the drawer or indorser. See the articles EXCHANGE and BILL.

RE-EXTENT, in law, a second extent upon lands or tenements, complaint being made that the former was partially executed. See the article EXTENT.

REFECTION, among ecclesiastics, a spare meal or repast just sufficing for the support of life: hence the hall in convents, and other communities, where the monks, nuns, &c. take their refectiions or meals in common, is called the refectory.

REFERENCE, in writing, &c. a mark relative to another similar one in the margin, or at the bottom of the page, where something omitted in the text is added, and which is to be inserted either in reading or copying. References are also used in books where things being but imper-

fectly handled, the reader is directed to some other part or place for a further explanation of them. For the use of these references in a work of this kind, we refer the reader to what has been said upon that subject in our introduction to this work.

REFINING, in general, is the art of purifying a thing; including not only the assaying or refining of metals, but likewise the clarification of liquors. See ASSAYING and CLARIFICATION.

REFINING of gold is performed three ways, *viz.* either with antimony, sublimate, or aqua fortis; the last of which is the most usual, and is called depart, or quartation. To refine gold with antimony, they make use of a wind-furnace, and a common crucible of a size answerable to the quantity of gold to be refined; always taking care that the gold and antimony, both together, do not fill the crucible more than half full. After the gold is melted in the crucible, the antimony is thrown in in powder: the proportion of the antimony to the gold is eight ounces to a pound, if the gold be between sixteen and twenty-two carats fine; if it be under sixteen carats, then they use five quarters of a pound to eight ounces of gold; and still the greater quantity of antimony is required, the coarser the gold is.

As soon as they have put the antimony into the crucible, they cover it, and after they have charged the furnace with charcoal, they put on the capital, which is let to stand till such time as the crucible is left quite bare; then they take off the capital, and leave the crucible to cool in the furnace of itself, till such time as they can take it out by the hand; then they break it, to get out the button or culot, which is a mass of fine gold remaining at the bottom, with the faces of the antimony, the silver and copper alloy, and sometimes little particles of gold itself over it.

But notwithstanding the gold thus prepared is very pure, yet the antimony gives it such a harsh brittle quality, that it ceases to be ductile, and must be softened by the fire with salt-petre and borax, to bring it to itself. In order to this operation, they prepare what is called a dry coppel, which is a coppel made of crucible earth, that does not imbibe like the coppels made of ashes. When the coppel has been sufficiently heated in the refining furnace, they put the gold into it, and cover it over with charcoal.

As soon as the gold is dissolved, which is very soon, by reason of the remains of the antimony, they blow it with the bellows to drive the mineral entirely away, which now goes off in smoak; and add to it, as soon as the fumes cease, a little salt-petre and borax in powder, which collect the impurities that remained upon the dissolution, and fix the gold in the coppel in the form of a plate. Then the gold is taken out of the coppel, and melted again in a crucible, with an addition of two ounces of salt-petre and borax in powder, to each eight ounces of gold, as soon as it has ceased to fume; and then it is cast into an ingot, which upon trial is found to be twenty-three carats, twenty-six thirty seconds fine.

The particles of gold, detained with the alloy in the fæces of the antimony, are got out by a dry coppel, with the same meltings and ingredients, as were used in softening the former: and when they are certain, by the assay, how much gold the matter contains, they refine it to separate the copper, and afterwards make the depart or quartation. See the article QUARTATION.

As for the gold which may be left sticking to the dry coppels, it is got by breaking and pulverizing the crucibles, and by repeated washings of the powder of them. The method of refining gold, by means of sublimate, is this: they begin the process like that with antimony; that is, in the same furnace, with the same coal, the same fire, and the same crucibles. When the gold is melted in the crucible, they cast in the sublimate, not in powder, but only broken into pieces: the proportion is, if the gold be of twenty-two carats, an ounce or an ounce and a half, or even two ounces of the sublimate to eight ounces of the gold; if of twenty carats, three ounces; and if it be only from eighteen to twelve, five or six ounces of the sublimate to eight of the gold, in which last case they part the sublimate into two, and put in one half at a time with the gold into a new crucible; which, when the operation is over, leaves the gold of eighteen or twenty carats, according as it was in fineness before. This done, they put the broken sublimate into a crucible with the melted gold, covering it immediately to smother the mineral; and then fill the furnace with charcoal, having first put on the capital; after a quarter of an hour they take off the capital, lay the crucible bare, and blow off

all the ashes and other impurities, that may be floating on the liquio gold, with a pair of bellows. This is repeated again and again, till the impurities of the gold are carried off by the sublimate, appearing of a bright glittering colour; after which being taken out of the crucible, it is cast into an ingot.

This method of refining by sublimate, is both cheaper and more complete than that by antimony; but they are both exceeding dangerous, by reason of the sulphureous and arsenical exhalations; on which account the method by quartation is most practised.

REFINING of silver is performed two ways; one with lead, and the other with salt-petre.

In order to refine silver with lead, a coppel is filled with a mixture of brick-ashes and ashes of bullock's and other bones. It is set on the fire, and heated red hot; in which state the silver and lead are put in together, in the proportion of a pound of lead to eight ounces of silver, and even somewhat more lead, if the silver be very coarse.

As these two metals melt together, the copper before mixt with the silver dissipates into smoak, or goes away with the scum; and so does the lead itself, leaving the silver alone in the coppel in its proper degree of fineness.

In this method of refining, wherein six or seven thousand pounds may be refined at once, the metal is drawn out of the coppel two ways; the one by plunging in it, while still liquid, a thick bar of iron, round which the silver sticks in form of a shell or crust, repeating this again and again; the other is by letting the coppel stand till it is cold; in the bottom of which, the silver fixes in form of a cake.

This method of refining silver with lead, is both the best and the cheapest: however, for want of workmen who understand it, that with salt-petre still obtains in many places; which is performed in a wind furnace. They first reduce the silver to be refined into grains, about the size of a small pea; which is done by first melting it, then throwing it into a tub of common water, and then heating it over again in a boiler. This being done, they put it into a crucible; putting to every eight ounces of silver two of salt-petre. Then they cover the crucible with an earthen lid (in the form of a dome) exactly luted; which lid, how-

ever, must have a little aperture in the middle. The crucible being set into the furnace, and covered with charcoal, which is only to be lighted by degrees, at length they give it the full force of the fire, to put the metal into a perfect fusion. This is repeated three times successively, at an interval of a quarter of an hour. After the third fire they uncover the furnace, and let the crucible cool; and at length break it, to get out the silver, which is found in a button or culot, the bottom of which is very fine silver; and the top mixed with the fæces of the salt-petre, and the alloy of the silver, and even some particles of fine silver. Then they separate the culot from the impurities, and melt it in a new crucible; and throw charcoal-dust into the dissolution, and work the whole briskly together. Then they cover the crucible up again, charge the furnace with coal, and give it a second fire.

Having done this, they blow off the ashes and impurities with bellows, from off the top of the metal, till it appears as clear as a looking-glass; and then they throw in an ounce of borax broken to pieces. Then, in the last place, they cover the crucible up again, and give it the last fire, and after this cast it into ingots, which are found eleven penny-weight and sixteen grains fine. To recover the silver that may be left in the fæces and scoria, they pound them, and give them repeated lotions in fresh water.

REFINING of sugar, sulphur, camphor, nitre, &c. See **SUGAR**, **CAMPBOR**, &c.

REFLECTING, or **REFLECTIVE DIAL**. See the article **DIAL**.

REFLECTION, or **REFLEXION**, in mechanics, the return or regressive motion of a moving body, occasioned by some obstacle which hindered it from pursuing its former direction.

For the laws of the reflection of moving bodies, see **MOTION**, **COMMUNICATION of motion**, and **PERCUSSION**.

REFLECTION of the rays of light, in catoptrics, is their return, after approaching so near the surfaces of bodies, as to be thereby repelled, or driven backwards. Thus the ray **AB** (plate **CCXXX**. fig. 2. n° 1.) proceeding from the radiant **A**, and striking on the point **B** of the speculum or plane **DE**, being returned thence to **C**; **BC** represents the reflected ray, and **B** the point of reflection; in respect whereof **AB** represents the incident ray, or ray of incidence, and **B** the

point of incidence. See **MIRROUR**.

Again, a line, as **CG**, drawn from any point, as **C**, of the reflected ray **BC**, perpendicular to the speculum, is called the cathetus of the reflection, or cathetus of the eye; as a line, **AF**, drawn from the radiant perpendicular to the speculum, is called the cathetus of incidence.

Of the two angles which the reflected ray **BC** makes with the mirror, the smallest, **CBE**, is called the angle of reflection; as, of the two angles the incident ray makes with the speculum, the smallest, **ABD**, is called the angle of incidence.

If the mirror be either concave or convex, the smallest angles the ray makes with a tangent to the point of reflection and incidence, are the angles of reflection and incidence.

The angle **CBH**, which the reflected ray makes with a perpendicular to the point of reflection, is called the inclination of the reflected ray; as the angle **ABH** is called the inclination of the incident ray.

The great law of reflection is, that the angle of reflection, **CBE**, is always equal to the angle of incidence, **ABD**, as has been demonstrated under the article **INCIDENCE**.

The rays of light are found by experiment to be differently reflexible, in the same manner, and for the same reason, that they are differently refrangible; or that those rays which were least and most refrangible, were also least and most reflexible; and, consequently, exhibit the same colours, and in the same order. See the article **COLOUR**.

Causes of the REFLECTION of light. The opinions of philosophers, relating to the cause of this difficult phenomenon, being principally four, are thus stated by Mr. Rowning. 1. It was the opinion of philosophers, before Sir Isaac Newton discovered the contrary, that light is reflected by impinging upon the solid parts of bodies. But that this is not the case, will appear from the following reasons: and, first, it is not reflected at the first surface of the body, by impinging against; for it is evident, that in order to the due and regular reflection of light, that is, that the reflected rays should not be dispersed and scattered one from another, there ought to be no rasures or unevenness in the reflecting surface large enough to bear a sensible proportion to the magnitude of a ray of light: because, if the

surface abounds with such, the reflected rays will rather be scattered like a parcel of pebbles thrown upon a rough pavement, than reflected with that regularity with which light is observed to form a well polished one, which are far from being so; for to polish is no other than to grind off the larger eminences and protuberances of the metal with the rough and sharp particles of sand, emery, or putty, which must of necessity leave behind them an infinity of rasures and scratches, which, though inconsiderable with regard to the former roughnesses, and too minute to be discerned by us, must, nevertheless, bear a large proportion to, if not vastly exceed, the magnitude of the particles of light.

Secondly, that it is not reflected by impinging upon the solid particles which constitute this second surface, is sufficiently clear from the foregoing argument; the second surfaces of bodies being as incapable of a perfect polish as the first; and it is farther confirmed from hence, *viz.* that the quantity of light reflected, differs according to the different density of the medium behind the body: and that it is not reflected by impinging upon the particles which constitute the surface of the medium behind it, is evident, because the strongest reflection of all at the second surface of the body, is when there is a vacuum behind it.

2. It has been thought by some, that it is reflected at the first surface of a body, by a repulsive force equally diffused over it, and at the second by an attractive force.

If there be a repulsive force diffused over the surface of bodies, that repels rays of light at all times, then, since by increasing the obliquity of a ray, we diminish its perpendicular force (which is that only whereby it must make its way thro' this repulsive force) however weakly that force may be supposed to act, rays of light may be made to fall with so great a degree of obliquity on the reflecting surface, that there shall be a total reflection of them there, and not one particle of light be able to make its way through, which is contrary to observation; the reflection of light at the first surface of a transparent body being never total in any obliquity whatever. The hypothesis, therefore, in this particular, must be false.

As to the reflection at the second surface by the attractive force of the body, this

may be considered in two respects, *viz.* when the reflection is total, and when it is partial.

And first, in cases where the reflection is total, the cause of it, undoubtedly, is that same attractive force by which light would be refracted in passing out of the same body: this is manifest from that analogy which is observable between the reflection of light at this second surface and its refraction there. For, cothewise, what can be the reason that the total reflection should begin just when the obliquity of the incident ray, at its arrival at a second surface, is such, that the refracted angle ought to be a right one; or when the ray, were it not to return in reflection, ought to pass on parallel to the surface, without going from it? For, in this case, it is evident, that it ought to be returned by this very power, and in such manner, that the angle of reflection shall be equal to the angle of incidence: just as a stone thrown obliquely from the earth, after it is so far turned out of its course by the attraction of the earth, as to begin to move horizontally, or parallel to the surface of the earth, is then, by the same power, made to return in a curve similar to that which is described in its departure from the earth, and so falls with the same degree of obliquity that it was thrown with.

But, secondly, as to the reflection at the second surface, when it is partial; an attractive force uniformly spread over it, as the maintainers of this hypothesis conceive it to be, can never be the cause thereof, because it is inconceivable, that the same force, acting in the same circumstances in every respect, can sometimes reflect the violet-coloured rays and transmit the red, and at other times reflect the red and transmit the violet.

This argument concludes equally against a repulsive force uniformly diffused over the first surface of a body, and reflecting light there; because some bodies reflect the violet and transmit the red, others reflect the red and transmit the violet at their first surface; which cannot possibly be upon this supposition, the rays of whichever of these colours we suppose to be the strongest.

3. Some being apprehensive of the insufficiency of a repulsive and attractive force diffused over the surface of bodies, and acting uniformly, have supposed, that by the action of light upon the sur-

faces of bodies, the matter of these forces is put into an undulatory motion, and that where the surface of it is subsiding, light is transmitted, and in those places where it is rising, light is reflected. But this seems to advance us not one jot farther; for in those cases, suppose where red is reflected and violet transmitted, how comes it to pass that the red impinges only on those parts when the waves are rising, and the violet when they are subsiding?

2. The last hypothesis is that of Sir Isaac Newton; who is of opinion, that light, in its passage from the luminous body, is disposed to be alternately reflected by, and transmitted through, any refracting surface it may meet; and this disposition he calls fits of easy reflection, and easy transmission. Thus, if we take the distances as the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, &c. then at these distances 0, 2, 4, 6, 8, &c. the light will be transmitted; and, at the distances 1, 3, 5, 7, 9, &c. it will be reflected in coloured rings.

These fits he thinks probably owing to some subtle and elastic substance, diffused through the universe, in the following manner: as bodies falling into water or passing through the air, cause undulations in each, so the rays of light may excite vibrations in this elastic substance: the quickness of which vibrations depending on the elasticity of the medium, the motion of the particles of it may be quicker than that of the rays; and therefore, when a ray, at the instant it impinges upon any surface, is in that part of a vibration of this elastic substance which conspires with its motion, it may be easily transmitted; and when it is in that part of a vibration which is contrary to its motion, it may be reflected. Also, when light falls on the first surface of a body, none is reflected there; but all that happens to it there is, that every ray that is not in a fit of easy transmission is there put into one, so that, when they come to the other side, the rays of one colour shall be in a fit of easy transmission, and those of another in a fit of easy reflection, according to the thickness of the body, the intervals of the fits being different in rays of a different kind. This doctrine of the easy reflection and easy transmission of the rays of light, ought by no means to be looked on as a mere hypothesis, since Sir Isaac has evinced, by experiments, that this is the

case. The first experiment he mentions is the compression of two prisms hard together, whose sides were a little convex, by which means they touched by a small part of their surfaces, and contained every where else a thin plate of air, as it may be properly called, whose thickness did every where gradually increase from the touching parts. He observed the place where they touched became absolutely transparent, as if they had there been one continued piece of glass. For when the light fell so obliquely on the plate of air between the prisms as to be all reflected, it seemed in that place of contact to be wholly transmitted, inasmuch that when looked upon, it appeared like a black or dark spot, by reason that little or no sensible light was reflected from thence, as from other places. When he looked through the prisms, this place of contact seemed, as it were, a hole in the plate of air; and through this hole objects that were beyond might be seen distinctly, which could not be seen through other parts of the glasses where the air was interjacent. By harder compression the spot was dilated by the yielding inwards of the parts of the glasses.

When the plate of air, by turning the prisms about their common axis, became so little inclined to the incident rays that some of them began to be transmitted, there arose in it many slender coloured arches, which at first were shaped almost like the conchoid, as in *ibid.* n^o 2. and by continuing the motion of the prisms, these arches increased and bended more and more about the said transparent spot, till they were completed into circles or rings encompassing it; and afterwards continually grew more and more contracted. These arches and rings became tinged with various colours, as the motion of the prisms was continued, being at first of a violet and blue; afterwards of a white, blue, violet; black, red, orange, yellow, white, blue, violet, &c. after this the coloured rings contracted, and became only black and white. The prisms being farther moved about, the colours all began to emerge out of the whiteness, and in a contrary order to what they had before.

But to observe more nicely the order of the colours which arose out of the white circles, as the rays became less and less inclined to the plate of air, Sir Isaac Newton made use of the two object-glasses,

glasses, one a plano-convex, and the other a double-convex, of the same sphericity on both sides, of fifty-one feet focal distance; and upon this he laid the plane side of the other, pressing them slowly together to make the colours successively emerge in the middle of the circles, and then slowly lifted the upper glass from the lower to make them successively vanish again in the same place.

Upon compression of the glasses, various colours would emerge and spread into concentric circles or rings of different breadths and tints encompassing the central spot. Their form, when the glasses were most compressed, is delineated, *ibid.* n° 3. where *a* is the central black spot, and the circuits of colours from thence outwards as follows:

- | | | |
|-------------------------------|-------------------------------|------------------------|
| 1 { <i>b</i> , blue. | 2 { <i>f</i> , violet. | 3 { <i>l</i> , purple. |
| 1 { <i>c</i> , white. | 2 { <i>g</i> , blue. | 3 { <i>m</i> , blue. |
| 1 { <i>d</i> , yellow. | 2 { <i>h</i> , green. | 3 { <i>n</i> , green. |
| 1 { <i>e</i> , red. | 2 { <i>i</i> , yellow. | 3 { <i>o</i> , yellow. |
| | 2 { <i>k</i> , red. | 3 { <i>p</i> , red. |
| 4 { <i>q</i> , green. | 5 { <i>s</i> , greenish blue. | |
| 4 { <i>r</i> , red. | 5 { <i>t</i> , red. | |
| 6 { <i>u</i> , greenish blue. | 7 { <i>y</i> , greenish blue. | |
| 6 { <i>x</i> , pale red. | 7 { <i>z</i> , reddish white. | |

These rings were observed to be least when the eye was held perpendicularly over the glasses in the axis of the rings: whereas, viewed obliquely, they became bigger, continually swelling as the eye was removed farther from the axis: and the coloured rings made in air, became much more distinct and visible, when viewed in a dark room by the reflection of the coloured light of the prism. The rings made by reflection of red light were manifestly bigger than those made by the blue and violet; and it was very pleasant to see them gradually swell and contract according as the colour of the light was changed. The motion was quickest in the red, and slowest in the violet; and, by an estimation made of the diameters of the rings, the thickneses of air in the places where the rings are made by the limits of the seven colours, red, orange, yellow, green, blue, indigo, violet, successively in order, were to one another as the cube roots of the squares of the eight lengths of a chord which sound the notes of an octave, that is, of the numbers

1. $\frac{8}{27}$, $\frac{5}{6}$, $\frac{3}{4}$, $\frac{2}{3}$, $\frac{1}{3}$, $\frac{1}{18}$, $\frac{1}{2}$.

These rings were not of various colours, as those made in the open air, but appeared all over of that prismatic colour only with which it was illumined; and

by throwing the coloured light directly on the glasses, that which fell on the dark spaces between the rings was transmitted through the glasses without any variation of the colour. This appeared by placing a white paper behind, on which the rings were painted of the same colour as those by reflected light, and of the bigness of their immediate spaces. Hence the origin of these rings is manifest; namely, that the air between the glasses, according to its various thicknes, is disposed in some places to reflect, in others to transmit the light of any one colour; and in the same place to reflect that of one colour, where it transmits that of another; in the manner as you see represented *ibid.* n° 4. where *A B, C D*, are the glasses, as before; and *a, c, e, g, i, l, n, p*, the parts of the beam transmitted; and *b, d, f, h, k, m, o*, the parts of the beam reflected, making the coloured rings.

REFLECTION of the moon, the same with her variation. See VARIATION.

REFLECTION is also used, figuratively, for an operation of the mind; whereby it turns its view backwards as it were upon itself, and makes itself and its own operation the object of its disquisition; and by contemplating the manner, order, and laws which it observes in perceiving ideas, comparing them together, reasoning, &c. it frames new ideas of the relations discovered therein. See the articles IDEA, KNOWLEDGE, REASONING, &c.

REFLEX, or REFLECT, in painting, is understood of those places in a picture which are supposed to be illuminated by a light reflected from some other body, represented in the same piece.

REFLEX VISION, that performed by means of reflected rays, as from mirrors. See the articles VISION, REFLECTION, and MIRROR.

REFLUX of the sea, the ebbing of the water, or its returning from the shore. See the article TIDES.

REFORM, a re-establishment, or revival of formerly neglected discipline, or a correction of the reigning abuses therein.

To REFORM, in a military sense, is to reduce a company, regiment, &c. either by disbanding the whole, or breaking a part, and retaining the rest.

REFORMADO, or REFORMED OFFICER, one whose troop or company is suppressed in a reform, and he continued either



Fig. 1. REFRACTION.

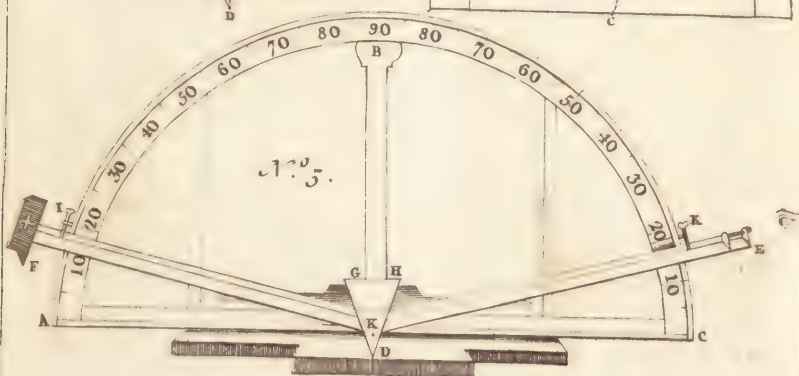
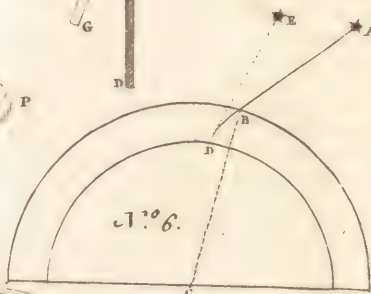
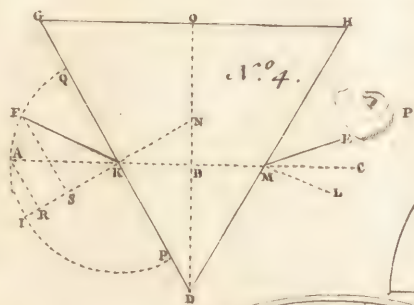
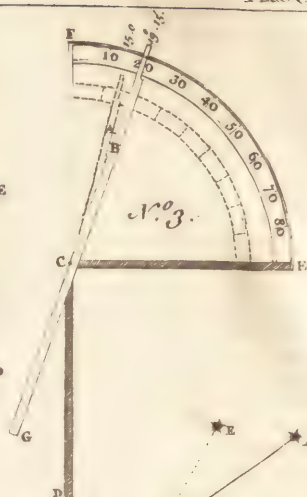
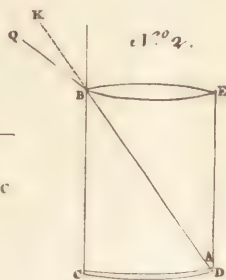
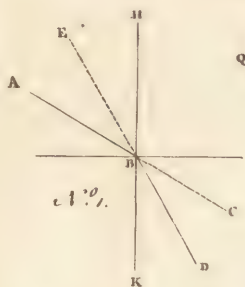


Fig. 2.
REGULAR BODIES.

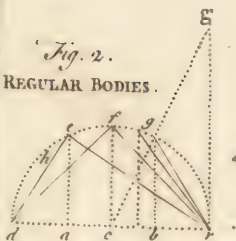


Fig. 3. The REGULUS
without a Crest.



Fig. 4. RESARCELÉE



either in the whole or half-pay, doing duty in the regiment.

REFORMATION, the act of reforming, or correcting an error or abuse in religion, discipline, or the like.

The reformation, so called by way of eminence, is the separation of the protestants from the church of Rome, in the beginning and towards the middle of the sixteenth century. See the article **LUTHERANS**, &c.

REFRACTED, or **REFRACTIVE DIAL**, one that shews the hour by means of some refractive transparent fluid. See the article **DIAL**.

REFRACTION, in general, is the deviation of a moving body from its direct course, occasioned by the different density of the medium it moves in; or, it is a change of direction, occasioned by a body's falling obliquely out of one medium into another of a different density. The great law of refraction, which holds in all bodies, and all mediums, is, that a body, passing obliquely out of one medium into another wherein it meets with less resistance, is refracted or turned towards the perpendicular; and, on the contrary, in passing out of one medium into another wherein the resistance is greater, it is refracted or turned from the perpendicular. Hence the rays of light, falling out of air into water, are refracted towards the perpendicular; whereas a ball, thrown into the water, is refracted from it. Now the reason of this difference is, that water, which resists the motion of light less than air, resists that of the ball more; or, to speak more justly, because water, by its greater attraction, accelerates the motion of the rays of light more than air does.

In order to illustrate the refraction of light, let AB (plate CCXXI. fig. 1. n° 1.) represent a ray moving in air from A to B, and passing into water at B; and let HK be perpendicular to the surface of the water at the point B. When therefore the ray enters the water, it does not continue its motion straight forward in the line BC, but in some other line, as BD, which is nearer or more inclined to the perpendicular BK: and, on the other hand, if the line DB be supposed to be a ray of light moving in water from D to B, and there passing into air, instead of continuing its motion straight forward in the direction BE, it goes on in some other direction as BA; which

being less inclined to, is more distant from, the perpendicular BH, as will appear from the following experiment. Let an empty vessel, as BCDE (*ibid.* n° 2.) have a small object placed at its bottom at A; and let it be so situated as that the sight of the object may be intercepted by the side of the vessel, from an eye placed at Q; then let the vessel be filled with water, and the ray AB, which, before the water was poured in, moved in a right line from A to K, and by so doing passed above the eye, will, upon its emergence out of the water, be bent downward, so as to strike upon the eye at Q, and thereby render the object at A visible. This bending of the rays of light, in their passage out of one medium into another, is owing to the attractive force of the denser medium acting upon the rays at right angles to the surface.

The fundamental law of the refraction of the rays of light is, that the sine of the angle of incidence is always in a constant ratio to the sine of the angle of refraction, in all inclinations of the incident ray whatever. See **INCIDENCE**.

Now that this is the case, whatever be the inclination of the incident ray, may be proved experimentally in the following manner: let a brass quadrant, CFE, (*ibid.* n° 3.) graduated on both sides, and fixed at its center C, to a perpendicular pillar, CD, have two indices, A and B, one on each side, moveable on the center C; and let the index A, whereof the stem G is a continuation, be made to point to the fifteenth degree, and the index B to the fifteenth minute of the twentieth degree: let then the pillar be immersed in water, till CE, the horizontal edge of the quadrant, touch the surface of the water; and upon viewing the stem G, immersed in the water, it will, by reason of the refraction, appear to have changed its situation, and to lie in a line with the index B. And the same thing will likewise obtain, if the index A be set at the thirtieth degree, and B at the thirtieth minute of the forty-second degree; that is, twenty-five, the sine of the lesser angle of incidence, is to thirty-three, the sine of the corresponding angle of refraction; as fifty, the sine of the greater angle of incidence, is to sixty-six, the sine of the angle of refraction corresponding thereto. And the same holds of

of all other angles of incidence and refraction.

Since then the ratio of these sines is constant, it remains that we determine what that ratio is in different mediums; in order to which we shall first premise the following lemma. Let GHD , (*ibid.* n° 4.) be an equilateral triangle, and let the angle D be bisected by the right line DO ; let AK , MC , be drawn parallel to the side GH , and through the point K draw IKN cutting OD in N : then is the angle $AKI = NKB$. Also the triangle is divided into two similar and equiangular triangles, NKB and BKD , by the perpendicular KB ; and, therefore, the angle NKB is equal to the angle KDB : all which is evident from Euclid's Elements.

Suppose now that GHD be the section of a prism of water or glass, or any pellucid medium; and KM a ray of light passing through it, parallel to the side GH ; and let it go out of the prism, and be refracted into the air, on each side, into the directions KF , ME : and, lastly, upon the point K , describe the semi-circle PIQ : then is $NKB (= KDB) = FKI$, the angle of incidence out of the prism into air, and AKI is the angle of refraction; consequently AR , and FS , are the sines of the angles of incidence and refraction, out of the prism into air. On the contrary, we may consider FK as the incident ray falling upon the prism in the point K , and refracted in the direction KM , parallel to the side GH , which at the point M emerges again into the air in the direction ME , making the angle EML , with the perpendicular ML , equal to the angle FKI . In this case the angle FKI is the angle of incidence, and NKB is the angle of refraction in the prism; which angle of refraction is therefore given, or constant, as it is always equal to the angle KDB , or half the angle of the prism.

The angle of incidence, FKI , consists of two parts, *viz.* of the given angle $AKI (= KDB)$ and the additional angle AKF . Now the angle AKI is known, as being equal to half the angle of the prism; and the angle AKF is known by placing the prism by the center of a graduated semi-circle, as ABC , (*ibid.* fig. 5.) carrying an index, whose two arms, FK and KE , are equally elevated above the horizontal line AC , and correspond to the incident and

emergent ray FK and ME in the other figure. For here it is evident, if an object be placed on the end of the arm F , it will be seen by an eye looking through the sights at the other end of the index E ; and when the object is thus seen, the angle AKF is known by the number of degrees which each arm cuts upon the limb of the semi-circle.

This number of degrees, added to the constant number thirty degrees, which is equal to half the angle of the prism, gives the whole angle of incidence FKI ; and thus the angle of incidence and refraction being found, the proportion of the sines FS and AR will be discovered, which ratio is always the same while the matter of the prism remains the same, as was before shewn from the theory, and may by this instrument be proved by experiment. For example, let the prism be of water, it will be necessary to elevate each arm twelve degrees upon the limb, before the image of the object at F can be seen by the eye at E ; then $12 + 30 = 42^\circ = FKA + AKI = FKI$, the angle of incidence. But the sine FS of 42° , is to the sine AR of 30° , as 4 to 3 very nearly.

Now it is plain, if the ratio of the sines AR and FS were not fixed, since FS might be in any ratio greater or less than AR , the incident ray FK may make an angle FKI greater or less than forty-two degrees, and yet the object at F be seen by the eye at E : but this we find by experiment to be impossible, because there is no elevation of the arms of the index that will exhibit the appearance of the object but the one above-mentioned.

If GHD were a prism of glass, as that is a denser body than water, so its refractive power will be greater; and, consequently, it will act more strongly on the ray KM , at its exit into the air, and cause it to be refracted farther from the perpendicular IK or ML . Therefore the angle of incidence out of air into glass, *viz.* FKI , ought to be greater, and so to require a greater elevation of the legs of the index than before in the prism of water: and this we find, by experiment, is the case; for then the elevation, instead of twelve degrees, must be about twenty-two or twenty-three degrees.

Hence it is plain, the sine of incidence, FS , must be in a constant ratio to the sine of refraction, AR ; because since the angle AKI is invariable, being always equal

to GDO; and in the same medium, GDH, the angle FKI must always be the same, because the refractive power is every where so: therefore, the angles being constant, the sines will be so too, or their ratio to each other always the same. And as by this instrument the angles of incidence and refraction, are discovered, the ratio of their sines will be known of course, for each respective medium: thus, in water the sine of forty-two degrees, is to the sine of thirty degrees, nearly as four to three; in glass, the sine of forty-six degrees is to the sine of thirty degrees, as three to two; or, more nearly as seventeen to eleven: and, to mention no more, it has been found, by some experiments, that the sine of incidence is to the sine of refraction in diamond, as five to two. But, since in physical matters no authority is comparable to that of Sir Isaac Newton, we shall give a table from his optics, shewing the proportion of the sines of incidence and refraction of yellow light, that being nearly a mean between the greatest and least refrangible rays; this is contained in the first column; the second column, expresses the densities of the bodies estimated by their specific gravities; and the third shew the refractive power of each body, in respect of its density.

The refracting body.	Proportion of the sines.	The density	Ref. power
Air - - -	3201 to 3200	0,0012	5208
Glass of ant.	17 to	9,52800	4864
Pseudo-topaz	23 to 14	4,2700	3979
A selenites	61 to 41	2,2520	5386
Com. glass	31 to 20	2,5800	5436
Crytl. of rock	25 to 16	2,6500	5450
Island crytl.	5 to 3	2,7200	6536
Sal gemme	17 to 11	2,1430	6477
Alum - - -	35 to 24	1,7140	6570
Borax - - -	22 to 25	1,7140	6716
Nitre - - -	32 to 21	1,9000	7079
Dantzick vit.	303 to 200	1,7150	7551
Oil of vitriol	10 to 7	1,7000	6124
Rain-water	529 to 396	1,000	7854
Gum-arabic	31 to 21	1,3750	8574
Spirit of wine rectified	100 to 73	0,8660	10121
Camphor	3 to 2	0,9960	12551
Oil-olive	22 to 15	0,9130	12607
Linseed-oil	40 to 27	0,9320	12819
Spir. of turp.	25 to 17	0,8740	13222
Amber - - -	14 to 9	1,4400	13654
A diamond	100 to 41	3,4000	14556

The refraction of the air in this table is determined by that of the atmosphere, as observed by astronomers; for if light pass through many refracting substances, or mediums, gradually denser and denser, and terminated with parallel surfaces, the sum of all the refractions will be equal to the single refraction it would have suffered in passing immediately out of the first medium into the last.

As to the different refrangibility of the several sorts of rays of light, it has already been explained under the articles COLOUR and RAINBOW.

REFRACTION, in astronomy. From what has been said, the refraction of the rays of light, issuing from a heavenly body, in passing through the atmosphere of our earth, will be easily understood. Thus, the ray AB (*ibid.* n^o 6.) proceeds from the star A in a right line, till it reach the atmosphere of the earth at B; upon entering which, it it will be refracted towards the perpendicular BC, supposed to be drawn from B to C, the center of the earth; and as it passes on through the atmosphere towards it, D, it will be continually refracted the same way, by reason it all along enters a denser part of the atmosphere; and hence it will describe the curve BD bending downwards, so as to render the object visible to a spectator at D. But, as all vision is performed in right lines, the spectator at D will see the star in the tangent line DE; and, consequently, the apparent place of the star will be E; which is higher, or nearer the zenith than its true place A.

From hence, it is, that the sun, moon, and stars appear above the horizon when just below it; and higher than they ought to do when they are above it.

Farther, the refraction of the heavenly bodies is greatest in the horizon, and gradually decreases as their altitudes increase, till near the zenith it becomes scarcely sensible, and in the zenith none at all. In taking, therefore, the altitudes of the heavenly bodies, it is absolutely necessary to subtract from the observed altitude their refractions, a table of which we have given under the article QUADRANT.

Refraction serves also to account for the oval appearance of the sun and moon near the horizon: for the lower these objects are, the greater is the obliquity with which their rays enter the atmosphere, to pass from the nearer to the denser parts of it; and, therefore, they appear to be

the more elevated by refraction; so that, when very near the horizon, the lower part of them is thereby more elevated than the upper part: and hence they appear of an oval figure, by reason their horizontal diameters are no ways altered, while their vertical or upright diameters are shortened by the different refractions of the upper and lower limbs. There is also another alteration made by refraction in the apparent distance of stars: thus, if two stars are in the same circle of altitude, their apparent distance is less than the true; but since refraction makes each of them higher than they really are, it must bring them into parts of the verticals, where they come nearer together.

REFRACTION of altitude is an arch of a vertical circle, whereby the altitude is increased by the refraction.

REFRACTION of declination is an arch of a circle of declination, whereby the declination of the object is either increased or diminished by the refraction.

REFRACTION of longitude is an arch of the ecliptic, whereby the longitude of the object is increased or diminished by the refraction.

REFRACTION of latitude is an arch of a circle of latitude, whereby the latitude of a heavenly object is either increased or diminished by its refraction.

REFRACTION in island crystal. There is a double refraction in this substance, contrary ways, whereby not only oblique rays are divided into two, and refracted into opposite parts, but even perpendicular rays, and one half of them refracted.

Caustic by REFRACTION. See the article **DIACAUSTIC CURVE**.

REFRANGIBILITY of light, the disposition of rays to be refracted. See **REFRACTION**, **LIGHT**, and **RAY**.

REFRIGERATIVE, in medicine, a remedy which refreshes the inward parts, by cooling them, as clysters, ptisans, &c.

REFRIGERATORY, in chemistry, a vessel filled with cold water, through which the worm passes in distillations; the use of which is, to condense the vapours as they pass through the worm.

REFUGE, a sanctuary or asylum. See article **ASYLUM**.

REFUGEES, french protestants, who by the revocation of the edict of Nantz, have been constrained to fly from persecution and take refuge in foreign countries.

REGAL, or **ROYAL**, something belonging to a king. See the article **ROYAL**.

REGALE, a magnificent entertainment or treat given to ambassadors, and other persons of distinction, to entertain or do them honour.

It is usual, in Italy, at the arrival of a traveller of eminence, to send him a regale, that is, a present of sweetmeats fruit, &c. by way of refreshment.

REGALE, in the french jurisprudence, is a royal prerogative, which consists in enjoying the revenues of bishoprics during the vacancy of their sees, of presenting to benefices, and of obliging the new bishop to take an oath of fidelity, and to register it in the chamber of accounts. The enjoyment of the fruits of the see is called the temporal regale; and that of presenting to the see, the spiritual regale.

REGALIA, in law, the rights and prerogatives of a king; which, according to civilians are six: viz. 1. the power of judicature: 2. the power of life and death: 3. the power of peace and war: 4. a right to such goods as have no owner, as waifs, estrays, &c. 5. assessments; and 6. the coinage of money.

Regalia is also used for the apparatus of a coronation, as the crown, the sceptre with the cross, that with the dove, St. Edward's staff, the globe, and the orb with the cross, four several swords, &c.

REGALIA of the church are the rights and privileges which cathedrals, &c. enjoy by the grants of kings; and this term is particularly used for such lands and hereditaments as have been given by kings to the church.

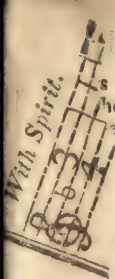
Regalia is also sometimes used for the patrimony of the church.

REGARD of the forest, the inspection or oversight thereof, or the office and province of the regarder. See **REGARDER**.

REGARDANT, in heraldry, signifies looking behind, and is used for a lion, or other beast, with his face turned towards his tail.

Villain REGARDANT, or **REGARDANT to the manor**, signifies a servant or retainer to the lord, who was thus called from his doing all the base services within the manor, and being charged to see that it was freed from every thing filthy and loathsome.

REGARDER, an antient officer of the king's forest, sworn to make the regard of the forest every year; that is, to take a view of its limits, to enquire into all offences and defaults committed by the foresters.



within the forest; and to observe whether all the other officers execute their respective duties.

or **RIGEL**, a fixed star of the magnitude, in orion's left foot, altitude is $72^{\circ} 10'$, and latitude See the article **ORION**.

river of Germany, which rises in mountains that divide Bohemia, and falls into the Danube.

REGENERATION, in theology, the act of being born again by a spiritual birth, or the change of heart and life, experienced by a person who forsakes a course of vice, and sincerely embraces a life of virtue and piety.

REGENT, one who governs a kingdom during the minority or absence of the king.

In France, the queen-mother has the regency of the kingdom during the minority of the king, under the title of queen-regent.

REGENT also signifies a professor of arts and sciences in a college, who has a set of pupils under his care; but here regent is generally restrained to the lower classes, as regent of rhetoric, regent of logic, &c. those of philosophy are rather called professors. The foreign universities are generally composed of doctors, professors, and regents.

REGICIDE, **KING-KILLER**, a word chiefly used with us in speaking of the persons concerned in the trial, condemnation and execution of king Charles I.

REGIFUGE, a feast celebrated in ancient Rome on the sixth of the calends of March, in memory of the expulsion of their antient kings, and particularly of Tarquin's flying out of Rome on that day.

REGIMEN, the regulation of diet, and in a more general sense, of all the non-naturals, with a view to preserve or restore health.

Dr. Mead observes, with respect to regimen, that diseases from inanition are generally more dangerous than those which proceed from repletion, because we can more expeditiously diminish than increase the juices of the body. Upon this account, though temperance is beneficial to all men, the antient physicians advised persons in good health to indulge a little now and then, by eating and drinking more plentifully than usual: but of the two, intemperance in drinking is safer than in eating; and if a person has committed excess in the latter, cold

water drank upon a full stomach will help digestion; to which it will be of service to add lemon-juice or elixir of vitriol, if he has eaten high seasoned things, rich sauces, &c. Then let him sit up for some time, and afterwards sleep. But if a man happens to be obliged to fast, he ought to avoid all laborious work. From satiety it is not proper to pass directly to sharp hunger, nor from hunger to satiety; neither will it be safe to indulge absolute rest immediately after excessive labour, nor suddenly to fall to hard work after long idleness. In a word, all changes in the ways of living should be made by degrees. It is also beneficial to vary the scenes of life, to be sometimes in the country, sometimes in town; to go to sea, to hunt, to be at rest now and then, but more frequently to use exercise, and a moderate sleep. See the articles **EXERCISE** and **SLEEP**.

The softer and milder kinds of aliment are proper for children, and for youths the stronger. Old people ought to lessen the quantity of their food, and increase that of their drink. But yet some allowance is to be made for custom, especially in the colder climates, like ours; for as in these the appetite is keener, so the digestion is better performed.

In the summer, when the spirits and fluid parts are apt to evaporate, the aliment should be light, moist, fluid, and easy of digestion, to repair the loss with the greater speed: and as digestion depends in part on the due preparation of the aliments, it is necessary to chew them well, especially if they are hard, that they may be the more intimately mixed with the saliva; for those who eat in a hurry, without much chewing, are very subject to indigestions. For the qualities of different kinds of food, see **DIET**, **DIGESTION**, **FLESH**, **FRUIT**, &c. It is well known, that cold stops the pores, and diminishes perspiration. To shun this inconvenience, it will be necessary to put on winter garments pretty early, and to leave them off late, and not to pass too suddenly from a hot into a cold air, and to avoid drinking any thing cold, when the body is hot, or when a person has been for some time speaking in public.

In short, the passions and affections of the mind produce very sensible effects. Joy, anger, fear, and sorrow, are the principal. In the first, the spirits are hurried with too great vivacity; in fear or dread, they

are as it were, curbed and concentrated; and continual sorrow and anguish of mind render the fluids of the body thick, and the blood unapt for a due circulation, whence proceed many chronic diseases: it is therefore, on all accounts, as much our interest as our duty, to keep the passions within due bounds, and to preserve an inward serenity, calmness and tranquillity.

REGIMEN, in chemistry, signifies the due regulation of fire. See the article **FIRE**.

REGIMEN, in grammar, that part of syntax, or construction, which regulates the dependency of words, and the alterations which one occasions in another.

Regimen is threefold, of nouns, of verbs, and of indeclinable words. See **NOUN**, **VERB**, and **INDECLINABLE**.

The regimen of latin-substantive nouns is mostly of the genitive case; but that of adjectives, is of the genitive, dative, accusative and ablative.

The regimen of verbs may be distributed into three classes, the first of which is the regimen of verbs personal; the second is that of verbs impersonal; and the third that of the infinitives, participles, gerunds, and supines. See the articles **VERB**, **PARTICIPLE**, &c.

The regimen of indeclinable words is that of the adverbs, prepositions, interjections and conjunctions. See the articles **ADVERB**, **PREPOSITION**, &c.

In general, the regimen, or constitution of government, is almost intirely arbitrary, and varies greatly in all languages. For one language forms its regimen by cases, as the latin and greek. Others, instead of cases, make use only of small particles, as the english by *of*, *to*, &c. The french, spanish, and italian by *de*, *a*, *da*, &c. There are, however, some few maxims which hold good in every language, as, 1. That there is no nominative case in any sentence but has a reference to some verb either expressed or understood. 2. That there is no verb which has not its nominative case expressed or understood, though in the latin before an infinitive, there is an accusative. 3. That there is no adjective but has a relation to some substantive. 4. That there is no genitive case but is governed by some other noun. The rule does not to apparently hold in the modern, as in the antient languages, in regard, the particles *of*, *de*, &c. which are the proper signs of the genitive case, are frequently used as prepositions. 5. That

the regimen of verbs is frequently laid upon different kinds of relations, according to custom or usage, which yet does not change the specific relation of each case, but only shews that custom has made choice of this or that according to fancy.

Sometimes these different governments have a power of changing the sense according to the different custom of languages, in which case the particular use of languages must be always consulted. There is one very common fault committed in regimen, which should be carefully avoided by accurate writers, *viz.* the using two verbs that require different cases together, as only governing one case, as in this example, "after embracing and giving his blessing to his son," where, "embracing," requires an accusative case, and "giving," a dative. The same is to be observed in the regimen of nouns.

REGIMENT, in war, is a body of men, either horse or foot, commanded by a colonel.

Each regiment of foot is divided into companies, but the number of companies is not always alike, though our regiments generally consist of thirteen companies, one of which is always grenadiers.

Regiments of horse most commonly consist of six troops, but some have nine. Regiments of dragoons, in time of war, are generally composed of eight troops, and in time of peace, of six. Each regiment has a chaplain and a surgeon. See the articles **TROOP** and **COMPANY**. Some german regiments consist of two thousand foot, and the regiment of Picardy in France, consists of 120 companies, or 6000 men.

REGIO ASSENSU, a writ by which the king gives his royal assent to the election of a bishop.

REGION, in geography, a large extent of land, inhabited by many people of the same nation, and inclosed within certain limits or bounds.

The modern astronmers divide the moon into several regions, or large tracts of land, to each of which they give its proper name.

REGION, in physiology, is taken for a division of our atmosphere, which is divided into the upper, middle, and lower regions.

The upper region commences from the tops of the mountains, and reaches to the
the

the utmost limits of the atmosphere. In this region reigns a perpetual, equable, calmness, clearness and serenity. The middle region is that in which the clouds reside, and where meteors are formed, extending from the extremity of the lowest to the tops of the highest mountains. The lowest region is that in which we breathe, which is bounded by the reflection of the sun's rays; or by the height to which they rebound from the earth. See **ATMOSPHERE** and **AIR**.

Æthereal REGION, in cosmography, is the whole extent of the universe, in which is included all the heavenly bodies, and even the orb of the fixed stars. See the article **ÆTHER**.

Elementary REGION, according to the Aristotelians, is a sphere terminated by the concavity of the moon's orb, comprehending the atmosphere of the earth.

REGION, in anatomy, a division of the human body, otherwise called cavity, of which anatomists reckon three, *viz.* the upper region, or that of the head; the middle region, that of the thorax or breast; and the lower, the abdomen, or belly. See the articles **HEAD**, **THORAX**, and **ABDOMEN**.

REGISTER, a public book, in which is entered and recorded memoirs, acts and minutes, to be had recourse to occasionally, for knowing, and proving matters of fact.

Of these there are several kinds; as, 1. Registers of deeds in Yorkshire and Middlesex, in which are registered all deeds, conveyances, wills, &c. that affect any lands or tenements in those counties, which are otherwise void against any subsequent purchasers, or mortgagees, &c. but this does not extend to any copyhold estate, nor to leases at a rack-rent, or where they do not exceed twenty-one years. The registered memorials must be ingrossed on parchment, under the hand and seal of some of the grantors or grantees, attested by witnesses who are to prove the signing or sealing of them, and the execution of the deed.

But these registers which are confined to two counties, are in Scotland general, by which the laws of North Britain are rendered very easy and regular. Of these there are two kinds; the one general, fixed at Edinburgh, under the direction of the lord-register; and the other is kept in the several shires, stewartries, and regalities, the clerks of which are ob-

liged to transmit the registers of their respective courts to the general register. No man in Scotland, can have a right to any estate, but it must become registered within forty days of his becoming seised thereof; by which means all secret conveyances are cut off. 2. Parish registers, are books in which are registered the baptisms, marriages, and burials of each parish.

REGISTER, is also used for the clerk or keeper of a register.

Of these we have several, denominated from the registers they keep; as register of the high court of delegates; register of the arches court of Canterbury; register of the court of admiralty; register of the prerogative court; register of the garter, &c.

REGISTER SHIPS, in commerce, are vessels which obtain a permission either from the king of Spain, or the council of the Indies, to traffic in the ports of the Spanish West-Indies; which are thus called, from their being registred before they set sail from Cadiz, for Buenos Ayres. Each of these permissions costs 30,000 pieces of eight, and by the tenor of the cedula, or permit, they are not to exceed 300 tons; but there is such a good understanding between the merchants, and the council of the Indies, that ships of 5 or 600 tons frequently pass unnoted; and though the quantity and quality of the merchandizes on board are always expressed, yet, by means of presents, the officers both in Spain and the Indies, allow them to load and unload, vastly more than the permission expresses.

REGISTER, in printing, is disposing the forms on the press, so as that the lines and pages printed on one side of the sheet, fall exactly on those of the other.

REGISTER, among letter founders, is one of the inner parts of the mould, in which the printing types are cast. See the article **Letter FOUNDRY**.

Its use is to direct the joining the mould justly together again, after opening it to take out the new cast letter.

REGISTERS, in chemistry, are holes, or chinks with stopples, contrived in the sides of furnaces, to regulate the fire; that is, to make the heat more intense, or remiss, by opening them to let in the air, or keeping them close to exclude it. There are also registers in the steam-engine. See the article **ENGINE**.

REGISTRY, the office, books, and rolls, in

in which the proceedings in chancery, or any spiritual court, are registred.

REGIUS *professor*. See **PROFESSOR**.

REGLET, or **RIGLET**, in architecture, a flat narrow moulding, used chiefly in pannels and compartments, to separate the parts or members from one another, and to form knots, frets, and other ornaments.

REGLETS, or **RIGLETS**, in printing, are thin slips of wood, exactly plained to the size of the body of the letter.

The smaller sorts are placed between the lines of poetry, and both those and the larger are used in filling up short pages, in forming the whites or distances between the lines of titles, and in adjusting the distances of the pages in the chase, so as to form register. See the articles **REGISTER** and **PRINTING**.

REGRATOR, or **REGRATER**, in law, formerly signified one who bought wholesale, or by the great, and sold again by retail; but the term is now used for one who buys any wares or victuals, and sells them again in the same market, or fair, or within five miles round it. See the article **FORESTALLING**.

REGRATOR, is also used for one who refurbishes up old moveables to make them pass for new. And masons, who take off the outward surface of hewn stone, in order to whiten it, or make it look fresh again, are said to regrade.

REGULAR, denotes any thing that is agreeable to the rules of art: thus, we say a regular building, verb, &c. See **BUILDING**, **VERB**, &c.

A regular figure, in geometry, is one whose sides, and consequently angles, are equal; and a regular figure with three or four sides, is commonly termed an equilateral triangle, or square, as all others with more sides are called regular polygons. See the articles **TRIANGLE**, **SQUARE**, and **POLYGON**.

All regular figures may be inscribed in a circle. See the articles **CIRCLE**, **PENTAGON**, **HEXAGON**, &c.

A regular solid, called also a platonic body, is that terminated on all sides by regular and equal planes, and whose solid angles are all equal. See **SOLID**. The regular bodies are the five following: 1. The tetrahedron, which is a pyramid, comprehended under four equal and equilateral triangles. 2. The hexahedron, or cube, whose surface is composed of six equal squares. 3. The oc-

tahedron, which is bounded by eight equal and equilateral triangles. 4. The dodecahedron, which is contained under twelve equal and equilateral pentagons. 5. The icosihedron, consisting of twenty equal and equilateral triangles. These five are all the regular bodies in nature. See **TETRAHEDRON**, &c.

The proportion of the sphere, and of the five regular bodies inscribed in the same circle from Peter Horigon. *Cursus Math.* vol. i. p. 779. and Barrow's *Euclid*, lib. xiii.

The diameter of the sphere being 2.

The circumference of the great-

est circle is	—	—	6.28318
Superficies of the greatest circles	3.	14	159
Superficies of the sphere	—	12.	56637
Solidity of the sphere	—	4.	18859
Side of the tetrahedron	—	1.	62299
Superficies of a tetrahedron	—	4.	6188
Solidity of a tetrahedron	—	0.	15132
Side of a cube or hexahedron	—	1.	1547
Superficies of the hexahedron	—	8.	
Solidity of the hexahedron	—	1.	5396
Side of an octahedron	—	1.	41421
Superficies of the octahedron	—	6.	9282
Solidity of the octahedron	—	1.	33333
Side of the dodecahedron	—	0.	71364
Superficies of the dodecahedron	—	10.	51462
Solidity of the dodecahedron	—	2.	78516
Side of the icosihedron	—	1.	05146
Superficies of the icosihedron	—	9.	57454
Solidity of the icosihedron	—	2.	53615

If one of these five regular bodies were required to be cut out of the sphere of any other diameter, it will be as the diameter of the sphere 2 is to the side of any one solid inscribed in the same (suppose the cube 1.1547) so is the diameter of any one sphere (suppose 8) to 9.2376, the side of the cube inscribed in this latter sphere.

Let dr (plate CCXXXI. fig. 2.) be the diameter of any sphere, and $da \frac{1}{2}$ of it $= ab = br$. Erect the perpendiculars ae , cf , and bg , and draw de , df , er , fr , and gr . Then will

1. re be as the side of the tetrahedron.
2. df is the side of the hexahedron.
3. de is the side of the octahedron.
4. Cut de in extreme and mean proportion in b , and db will be the side of the dodecahedron.
5. Set the diameter dr up, perpendicularly at r , and from the center c , to its top, draw the line cg , cutting the circle in g . Let fall the perpendicular gb ; then is br the side of the icosihedron.

REGU-

REGULAR curves, such as proceed gradually in the same geometrical manner, with regard to their curvities. See the article **CURVE**.

REGULAR, in a monastery, a person who has taken the vows; because he is bound to observe the rules of the order he has embraced. See the article **MONK**.

REGULAR priest, a priest in some religious order; in contradistinction to a secular priest, or one that lives in the world at large. See the article **PRIEST**.

REGULAR places, those contained within the boundary or inclosure of the convent. See the article **CONVENT**.

REGULATION, a rule or order prescribed by a superior, for the proper management of some affair.

REGULATOR of a watch, the small spring belonging to the balance; serving to adjust its motions, and make it go faster or slower. See **WATCH**.

REGULUS, in ornithology, the name of several birds of the motacilla-kind, as,
1. The crested regulus, about the size of the common wren; the head, neck, and back of which are of a mixed colour of greenish and grey, its breast and belly of a pale grey, and its wings variegated with black and yellow; the head in the male is ornamented with an orange-coloured crest or crown; whence the names regulus, tryannus, &c.
2. The yellow wadded, greyish green regulus, without a crest: this is a very elegant little bird, about the size of the former species; the sides of its head are ornamented with an oblong yellow line, running from the eyes to the hinder part of the head. See plate CCXXXI. fig. 3.

REGULUS, in chemistry, an imperfect metallic substance, that falls to the bottom of the crucible, in the melting of ores, or impure metallic substances.

This operation almost always requires the addition of such ingredients as take away the mutual connection between the parts to be separated; that is, the menstrual virtue, by means of which one keeps the other in a state of dissolution. For instance, the reguline part of antimony, and mineral sulphur, mutually dissolve each other, and constitute crude antimony; nor can they be separated by fire alone without destroying the regulus: but if you add iron, copper, silver, &c. which are more thoroughly penetrated by sulphur, then the regulus of antimony is freed of the sulphur, and being heavier

than the additional bodies then joined to it, sinks to the bottom. See **FLUX**.
Regulus of antimony is of three kinds, viz. the regulus of antimony, simply so called, martial regulus of antimony, and stellated regulus of antimony.
1. The first is prepared as follows: Take antimony, nitre, and crude tartar, of each equal parts; grind them separately into a powder, then mix, and rub them all together; after which, throw the powder by degrees into a red hot crucible, taking care to break the crust, which forms on the surface, with an iron rod; when the detonation is over, let a strong fire be made, that the matter may flow like water, then pour it out into a warm greased cone, which is to be gently struck on the sides, that the regulus may separate and fall to the bottom; when grown cold, let the regulus be cleaned from the scoræ that lie a-top of it.
2. Martial regulus of antimony is thus made: take antimony and nitre of each a pound; and crude tartar half a pound; and small pieces of iron, half a pound: heat the iron in a crucible to a white heat: then gradually add the other ingredients, first powdered and mixed together, and proceed in the same manner as in the foregoing process.
3. Stellated regulus of antimony is made by melting the martial regulus several times with fresh nitre and tartar.

The foregoing reguli are at present rarely, if ever, made use of in medicine: the emetic cups, and perpetual pills, formerly made from them, have long been laid aside, as precarious and unsafe; but the scoræ produced in these several processes, afford medicines less violent, some of which are in considerable esteem.

However, they are of use in several mechanic arts, and particularly in mixing with tin, in making pewter. See **PEWTER**.

REGULUS, in astronomy, a star of the first magnitude, in the constellation leo, called also from its situation, *cor leonis*, or the lion's heart.

Its longitude, according to Mr. Flamsteed, is $25^{\circ} 31' 20''$, and its latitude $0^{\circ} 26' 38''$ north.

REHABILITATION, in the civil and canon law, the restoring a delinquent to his former condition.

REHEARSAL, in music, and the drama, an essay or experiment of some composition generally made in private, previous to its representation or performance in public, in order to render the actors and per-

performers more perfect in their parts.
REIMBURSEMENT, in commerce, the act of repaying another the expences he has been at on our account.

REIN-DEER, in zoology, a species of the cervus, with horns ramose and cylindric, with their tops palmated. See the article **CERVUS**.

This is a large and beautiful species, not inferior to the elk in size or strength, but greatly exceeding it in form; it is of the size of a small horse, but its shape is exactly that of the red-deer. It is a native of the northern regions, there being no country so far north as not to afford it, where it is of vast use to the inhabitants, as a beast of draught.

REINFORCED, or **RENFORCED RING**, of a cannon, is the next after the trunnions, betwixt them and the touch-hole.

REINFORCEMENT, in war, a fresh supply of men, arms, ammunition, &c.

REINTEGRATION. See the article **REDITEGRATION**.

REINS, in anatomy, the same with kidneys. See **KIDNEYS**.

REINS of a bridle, are two long slips of leather, fastened on each side of a curb or snaffle, which the rider holds in his hand, to keep his horse in subjection.

There is also what is called false reins, which is a lath of leather, passed sometimes through the arch of the banquet, to bend the horse's neck.

REINSTATING, restoring a person or thing, to its former state or condition.

REJOINTING, in architecture, filling up the joints of the stones in buildings. This ought to be performed with the best mortar, as that of lime and cement, and sometimes with plaster, as in the joints of vaults.

REJOYNDER, or **REJOINDER**, in law, is the defendant's answer to the plaintiff's replication or reply. Thus, in the court of chancery, the defendant puts in an answer to the plaintiff's bill, which is sometimes also called an exception; the plaintiff's answer to this is called a replication, and the defendant's answer to that a rejoinder.

REIS, **RE**, or **RES**. See **REB**.

REITERATION, the act of repeating a thing, or doing it a second time.

RELAPSE, a falling again into a danger, evil, or disease, from which a person has escaped.

RELATION, *relatio*, in philosophy, the mutual respect of two things, or what each is with regard to the other.

The idea of relation is acquired, by comparing one thing with another; and the denominations given to the respect, which they bear to each other, are termed relatives, and the things themselves related.

Relations make the largest class of our perceptions, since every single object admits of almost innumerable comparisons with others: thus, if we compare one thing with another in respect of bulk, we get the ideas of greater, less, or equality; if in respect of time, of older and younger; and so for other relations, which we can pursue at pleasure, almost without end; whence it is easy to conceive, how very extensive this tribe of our perceptions must be. However, here, as well as in the other kinds of our complex ideas, we bound ourselves for the most part to such comparisons, as the exigencies of society, the wants of life, and the different professions of men render necessary; and are more or less accurate in tracing out the relations of things, according to the degree of importance they appear to have in these respects. The relations of men one to another, arising either from the ties of blood, their several ranks and places in the community, or a mutual intercourse of good offices, being of great weight and concern in the commerce of life, have in a particular manner engaged our attention, and are therefore very minutely described. For the same reason men have found it necessary, to determine as exactly as possible, the various dependence of things, as their happiness is nearly connected with this knowledge. When we consider objects merely in respect of existence, as either giving or receiving it, we come by the relative ideas of cause and effect, which are very nearly connected with the welfare of mankind; it being evident, that the several schemes and purposes of life are all conducted upon a previous supposition, that certain known causes will have their usual regular effects, and such and such actions be attended with such and such consequences. See the articles **CAUSE**, **EFFECT**, and **EXPERIMENTAL PHILOSOPHY**.

But there are other relations of this kind, as when we also take in the additional gifts of a capacity for happiness, and the means of attaining it; which constitutes the relation of creator and creature, in the more solemn acceptation

of these words. Again, when we consider the great author of our being, not only as the creator of the universe, but also as preserving and holding it together, and presiding over the present frame of things with uncontrouled dominion; he then appears under the notion of a moral governor, to whom we are accountable for our actions, and the use we make of those powers and faculties we derive from him. And thus we may, in some measure, perceive, how the mind proceeds in comparing its ideas together, and by what views it is chiefly governed in framing the compound notions of this class, by which it represents the various habitudes of things.

We shall only add two more observations upon this subject: 1. That our ideas of relations are, for the most part, very clear and distinct; for the comparing of things together being a voluntary act of the mind, we cannot but suppose it must be acquainted with its own views in the comparison; and, of course, have a clear conception of the foundation of that relation; and what is still more remarkable of the ideas of this class, they cease not to be distinct, even when the subjects compared are but imperfectly known; for though we cannot comprehend the manner of the world's being created, yet we find no difficulty in framing the ideas the relative words creator and creature stand for. 2. Our ideas of relations are among the most important conceptions of the understanding, and afford the largest field for the exercise and improvement of human knowledge. See the article KNOWLEDGE.

Moral actions are nothing but relations, it being their conformity or disagreement with some rule that makes them either good or bad, or indifferent; and indeed, we ought carefully to distinguish between the positive idea or the action, and the reference it has to a rule. Thus, the taking from another what is his, without his consent, is properly called stealing; but that name being commonly understood to signify also the moral pravity of the action, men are apt to condemn whatever they hear called stealing as an ill action, disagreeing with the rule of right: and yet the private taking away his sword from a madman, to prevent his doing mischief, though it be properly denominated stealing, is nevertheless agreeable to the law of God. See the articles ETHICS and MORALITY.

It would be infinite to go over all sorts of relations; we have therefore contented ourselves with mentioning some of the most considerable, and such as may serve to let us see from whence we get our ideas or relations, and wherein they are founded.

RELATION, among the ancient logicians, constituted one of the ten categories, or predicaments. See CATEGORY.

RELATION, in geometry, signifies the same with ratio. See RATIO.

RELATION, in grammar, is the correspondence which words have to one another in construction.

RELATION is also used for analogy. See the article ANALOGY.

RELATION, in law, is where two times, or other things, are considered as if they were one and the same; and by this the thing subsequent is said to take its effect, by relation, from the time preceding; thus, in case of a deed of bargain and sale inrolled, the inrollment shall have relation to the delivery thereof; and in our courts, a judgment has always relation to the first day of term.

RELATIVE, something relating to, or respecting, another. See the preceding article.

RELATIVE TERMS, in logic, are words which imply a relation: such are master and servant, husband and wife, &c.

In grammar, relative words are those which answer to some other word foregoing, called the antecedent: such are the relative pronouns, *qui, quæ, quod, &c.* and in english, *who, whom, which, &c.* The word answering to these relatives is often understood as, *I know whom you mean, for, I know the person whom you mean.*

RELAXATION, in medicine, &c. the act of loosening or slackening, or the looseness and slackness of the fibres; nerves, muscles, &c.

RELAXATION, in law, is the same with releasing. See the article RELEASE.

RELAY, a supply of horses placed on the road, and appointed to be ready for a traveller to change, in order to make the greater expedition.

In hunting, relay signifies fresh sets of dogs, or horses; or both, placed in readiness, in case the game comes that way, to be cast off, or to mount the hunters, in lieu of the former, which are supposed to want respite.

RELAY, in tapestry, is an opening left, where the colours and figures are to

be changed, when the piece is finished. **RELEASE**, in law, is an instrument in writing, by which estates, rights, titles, entries, actions, and other things, are extinguished and discharged; and sometimes transferred, abridged, or enlarged: and, in general, it signifies one person's giving up or discharging the right or action he has, or claims to have, against another, or his lands, &c.

A release may be either in fact or in law; a release in fact is, where it is expressly declared, by the very words, as the act and deed of the party; and a release in law is that which acquits by way of consequence, as where a feme creditor takes the debtor to husband.

The person releasing is termed the releasor, and he to whom the release is made, the releasee.

RELEGATION, a kind of banishment or exile, in which a person is sentenced to retire to a certain place prescribed, and to continue there a certain time, or till he is recalled.

In Rome, relegation was a less severe punishment than deportation, since he who was relegated, neither lost the rights of a roman citizen, nor those of his family, as the authority of a father over his children, &c.

RELICS, in the romish church, the remains of the bodies or cloaths of saints or martyrs, and the instruments by which they were put to death, devoutly preserved, in honour to their memory; kissed, revered, and carried in procession.

This is a piece of superstition which began very early in the christian church, and at present makes no inconsiderable article of popery. The shrines in which they are deposited are first sprinkled with holy water and solemnly blessed. The substance of the prayer on this occasion is, that God would grant his protection to such as revere the merits of his saints, and humbly embrace their relics; to the end that these faithful supplicants may be guarded from the power of the devil, from thunder, plague, bad air, wild beasts, and from the hostilities and machinations of men.

The catacombs are an inexhaustible fund of relics; yet it is still disputed who were the persons interred in them. See the article **CATACOMB**.

The translation of relics, or depositing them in some church, is performed with great care and ceremony. Before they are translated, they are examined by the

bishop, who pronounces a solemn benediction over them. On the day of their translation, the houses in the streets thro' which they pass, are covered with tapestry: the church and altar are pompously adorned, and the images of the saints ranged in open view. The relics are carried in procession under a canopy, the clergy walking before, and the people surrounding them with lighted tapers in their hands. As soon as they enter the church, Te Deum is sung, and the relics are set upon the altar. Prayers are appointed in honour of them, and a lamp is left burning day and night before the place where they are afterwards deposited.

RELICT, in law, the same with widow. See the article **WIDOW**.

RELIEF, in law, a certain sum of money which every freehold-tenant, being at age, formerly paid, and in some places still pays to his lord, on his entrance upon the inheritance of his ancestor's lands, &c. by the payment of which money the heir is said to relieve, or raise again the lands, after they were fallen into the superior's hands.

A person may hold lands of another, by rent, and a customary relief, which is only payable by freeholders; and for which the lord may distrain, but cannot bring an action of debt, though his executors may. These reliefs are, in some places, half a year, or a year's rent, and the profits of the lands; and in others, double the same for that year.

RELIEF, in chancery, is an order sued out, for dissolving contracts and other acts, on account of their being unreasonable, prejudicial, or grievous; or from some other nullity, either de jure, or de facto.

RELIEF of a bare, among hunters, is the place where she goes to feed in an evening.

RELIEF, in sculpture. See **RELIEVO**.

RELIEVE, in a military sense, is to send off those men that are upon duty, and to bring others to take their place: thus, to relieve the guard, the trenches, &c. is to bring fresh men upon duty, and to discharge those who were upon duty before.

RELIEVO, or **RELIEF**, in sculpture, &c. is the projecture or standing out of a figure, which arises prominent from the ground or plan on which it is formed; whether that figure be cut with the chisel, moulded, or cast.

There are three kinds or degrees of relieve, viz. alto, basso, and demi-relievo.

The alto-relievo, called also haut relief, or high-relievo, is when the figure is formed after nature, and projects as much as the life. Basso-relievo, bas relief, or low-relievo, is when the work is raised but a little from the ground, as in medals, and the frontispieces of buildings; and particularly in the histories, festoons, foliages, and other ornaments of friezes. Demi-relievo is when one half of the figure rises from the plan. When, in a basso-relievo, there are parts that stand clear out, detached from the rest, the work is called a demi-basso.

In architecture, the relievo or projecture of the ornaments, ought always to be proportioned to the magnitude of the building it adorns, and to the distance at which it is to be viewed.

RELIEVO, or RELIEF, in painting, is the degree of boldness with which the figures seem, at a due distance, to stand out from the ground of the painting.

The relievo depends much upon the depth of the shadow, and the strength of the light; or on the height of the different colours, bordering on one another; and particularly on the difference of the colour of the figure from that of the ground: thus, when the light is so disposed as to make the nearest parts of the figure advance, and is well diffused on the masses, yet insensibly diminishing, and terminating in a large spacious shadow, brought off insensibly, the relievo is said to be bold, and the clear obscure well understood.

RELIGION, that worship and homage which is due to God, considered as our creator, preserver, and most bountiful benefactor.

As our affections depend on our opinions of their objects, it seems to be among the first duties we owe to the author of our being, to form the least imperfect, since we cannot form perfect, conceptions of his character and administration: for such conceptions will render our religion rational, and our dispositions refined. If our opinions are diminutive and distorted, our religion will be superstitious, and our temper abject. Thus, if we ascribe to the Deity that false majesty, which consists in the unbenevolent and sullen exercise of mere will or power, or suppose him to delight in the prostrations of servile fear, or as servile praise, he will be worshiped with mean adulation, and a profusion of compliments. If he be looked upon as a stern and implacable

being, delighting in vengeance, he will be adored with pompous offerings, or whatever else may be thought proper to soothe and mollify him. But if we believe perfect goodness to be the character of the supreme Being, and that he loves those who resemble him most, in this, the most amiable of his attributes, the worship paid him will be rational and sublime, and his worshippers will seek to please him by imitating that goodness which they adore. Indeed, wherever right conceptions of the Deity, and his providence, prevail, when he is considered as the inexhausted source of light, and love, and joy, as acting in the joint character of a father and governor, what veneration and gratitude must such conceptions, thoroughly believed, excite in the mind? how natural and delightful must it be, to one whose heart is open to the perception of truth, and of every thing fair, great, and wonderful in nature, to engage in the exercises of religion, and to contemplate and adore him, who is the first fair, first great, and first wonderful; in whom wisdom, power, and goodness dwell vitally, essentially, and act in perfect concert? what grandeur is here, to fill the most enlarged capacity, what beauty to engage the most ardent love, what a mass of wonders, in such exuberance of perfection, to astonish and delight the human mind, through an unending duration! When we consider the untainted purity, and absolute perfection of the divine nature; and reflect on the imperfection and various blemishes of our own; and the ungrateful returns we have made to his goodness, we must sink, or be convinced we ought to sink, into the deepest humility and prostration of soul before him, and be conscious that it is our duty to repent of a temper and conduct so unworthy of our nature, and so unbecoming our obligations to its author; and to resolve and endeavour to act a wiser and a better part for the future. And if the Deity is considered as the father of mercies, who loves his creatures with infinite tenderness, and, in a particular manner, all good men; nay, who delights in goodness even in its most imperfect degrees; what resignation, what dependence, what generous confidence, what hope in God, and in his all-wise providence, must arise in the soul that is possessed of such amiable views of him. We must further observe, that all those affections which regard the Deity as their immediate and primary object, are

vital energies of the soul, and consequently exert themselves into act, and, like all other energies, gain strength or greater activity by that exertion: it is therefore our duty, as well as highest interest, often, at stated times, and by decent and solemn acts, to adore the great original of our existence, to express our veneration and love by a devout recognition of his perfections, and to evidence our gratitude by celebrating his goodness, and thankfully acknowledging all his benefits; by proper exercises of sorrow and humiliation to confess our ingratitude and folly, to signify our dependence on God, our confidence in his goodness, and our resignation to the disposals of his providence, and this not only in private, but in public worship, where the presence of our fellow-creatures and the powerful contagion of the social affections, conspire to kindle and spread the devout flame with greater warmth and energy.

Religion is divided into natural and revealed: by natural religion is meant that knowledge, veneration, and love of God, and the practice of those duties to him, our fellow-creatures, and ourselves, which are discoverable by the right exercise of our rational faculties, from considering the nature and perfections of God, and our relation to him and to one another. See **ETHICS**. And by revealed religion is meant, natural religion explained, enforced, and enlarged, from the express declarations of God himself, from the mouths or pens of his prophets, &c.

Religion, in a more contracted sense, is used for that system of faith and worship, which obtains in several countries of the world; and even for the various sects into which each religion is divided. See the articles **PAGANISM**, **MAHOMETANS**, **JEWS**, &c. **ROMAN**, **LUTHERANS**, **CALVINISTS**, &c.

RELIGIOUS, in popish countries, is particularly used for a person engaged, by solemn vows, to the monastic life: or a person shut up in a monastery, to lead a life of devotion and austerity, under some rule or institution. See the articles **MONK**, **NUN**, &c.

RELIQUARY, a shrine or casket, wherein the relics of a dead saint are kept.

RELIQUÆ, in roman antiquity, the ashes and bones of the dead, that remained after burning their bodies; which were gathered up, put into urns, and afterwards deposited in tombs. This word is also used for relics. See **RELICS**.

RELL-MOUSE, in zoology, the white belied mus, with a blackish back and a long body. See the article **MUS**.

This creature is not so thick in the body as the common rat, but is longer, and approaches in some degree to the form of the weasel; the head is oblong, large at the upper part, but very slender at the snout; both the jaws are equal in length, and the upper lip is split, as in the hare; the teeth are long, slender, and sharp; the eyes are black and prominent; the ears are short, naked, and obtuse; the tail is short and hairy; and the legs are short, especially the anterior pair.

REMAINDER, in law, is an estate in lands, tenements, or rents, not to be enjoyed till after a term of years, or another person's decease: thus, a person grants lands or tenements to one person, for a term of years, or for life, and the remainder to another person for life, or in fee.

There is this difference between a remainder and a reversion; in case of a reversion, the estate granted, after the limited time, reverts to the grantor or his heirs; but by a remainder it goes to some third person, or a stranger.

REMAINDER, in mathematics, is what is left after taking a lesser number out of a greater.

REMARRYING, marrying a second time. See the article **MARRIAGE**.

REMEDY, in medicine, a preparation applied either internally or externally, for the cure of a disease. See **PRESCRIPTION**.

REMEMBRANCE, the same with memory. See the article **MEMORY**.

REMEMBRANCERS, antiently called clerks of the remembrance, certain officers in the exchequer, whereof three are distinguished by the names of the king's remembrancer, the lord treasurer's remembrancer, and the remembrancer of the first fruits. The king's remembrancer enters in his office, all recognizances taken before the barons, for any of the king's debts, for appearances or observing of orders; he also takes all bonds for the king's debts, &c. and makes out processes thereon. He likewise issues processes against the collectors of the customs, excise, and others, for their accounts; and informations upon penal statutes, are entered and sued in his office, where all proceedings in matters upon english bills in the exchequer-chamber, remain. His duty further is to make out the bills of compositions upon penal laws, to take the

the statement of debts; and into his office are delivered all kinds of indentures and other evidences, which concern the assuring any lands to the crown. He, every year, in *crastino animarum*, reads in open court, the statute for election of sheriffs; and likewise openly reads in court, the oaths of all the officers, when they are admitted.

The lord treasurer's remembrancer is charged to make out process against all sheriffs, escheators, receivers, and bailiffs, for their accounts. He also makes out writs of *ieri facias*, and extent for debts due to the king, either in the pipe or with the auditors; and process for all such revenue as is due to the king, on account of his tenures. He takes the account of sheriffs; and also keeps a record, by which it appears whether the sheriffs or other accountants pay their profits due at Easter and Michaelmas: and at the same time he makes a record, whereby the sheriffs or other accountants keep their prefixed days: there are likewise brought into his office, all the accounts of customers, comptrollers, and accountants, in order to make entry thereof on record: also all estreats and amercements are certified here, &c.

The remembrancer of the first-fruits takes all compositions and bonds for the payment of first-fruits and tenths; and makes out process against such as do not pay the same.

REMINISCENCE, *reminiscentia*, that power of the human mind, whereby it recollects itself, or calls again into its remembrance such ideas or notions as it had really forgot: in which it differs from memory, which is a treasuring up of things in the mind, and keeping them there, without forgetting them. See the article **MEMORY**.

Hence memory may be considered as a continual remembrance, and reminiscence as an uninterrupted memory. How near akin soever these two faculties may seem, yet they are generally found separated so, that they who excell in the one, are usually defective in the other.

REMINISCERE, the second Sunday in lent. See the article **LENT**.

REMISSION, in physics, the abatement of the power, or efficacy of any quality, in opposition to the increase of the same, which is called intension. In all qualities capable of intension and remission, the intension decreases reciprocally as the

squares of the distances from the center of the radiating quality increase.

REMISSION, in medicine, is when a distemper abates, but does not go quite off before it returns again, as is common in fevers, which do not quite intermit.

REMISSION, in law, &c. denotes the pardon of a crime, or the giving up the punishment due thereto.

REMIT, in commerce. To remit a sum of money, bill, or the like, is to send the sum of money, &c.

To remit is also used among bankers, for what is usually given a banker, or as it were discounted with him, for his giving a bill of exchange.

REMITTANCE, in commerce, the traffic or return of money from one place to another, by bills of exchange, orders, or the like.

This word is also used in speaking of the payment of a bill of exchange. It also signifies the fee or reward given a banker, both of his wages and the different value of the species in the places where you pay the money, and where he remits it.

REMITTER, in law. Where a person has two titles to lands, &c. and he comes to such lands by the last title, which, proving defective, he shall be restored to, and adjudged in, by virtue of his former more antient title, this is called remitter. In case lands descend to a person, that had right to them before, he shall be remitted to his better title, if he pleases. Where a tenant in tail makes a feoffment of land, upon condition, after whose death, his issue within age enters, for the condition broken, he shall be first in as a tenant in fee, and be remitted as heir to his father: yet if the heir is of age, it will be no remitter to him, who is to bring his writ of formedon against the feoffee. Also if a tenant in tail infeoff his son or heir apparent, at that time under age, and afterwards dies, this is a remitter to the heir; but here it would be otherwise, were he of full age. By a remitter of issue in tail, all charges on the land are avoided; and where a person is remitted to an estate for life, the dower claimed by a widow may be gone; in which case also an estate is liable to be forfeited upon making a feoffment thereof, &c.

REMITTITUR, in law, an entry made in the king's bench, on a writ of error's abating in the exchequer chamber.

REMONSTRANCE, an expostulation or humble

humble supplication, addressed to a king, or other superior, beseeching him to redress the inconveniences, or ill consequences of some order, edict, or the like. This word is also used for an expostulatory counsel, or advice; or a gentle and handsome reproof, made either in general, or particular, to apprize or correct some fault, &c.

REMORA, the *SUCK-FISH*, in ichthyology, a species of *echeneis*. See *ECHENEIS*. This singular fish grows to about nine inches in length, and more than two in diameter in the largest part of the body, which is near the head, whence it becomes gradually smaller to the tail; the back is convex, the belly flat, and the sides are rounded by means of the structure of its head. This fish applies itself firmly to any solid body that it pleases; and is frequently found sticking to the bottom of ships, and often to large fish. See plate CCXXX. fig. 3.

REMOUNT, in war. To remount the cavalry, is to furnish troopers or dragoons with fresh horses, instead of such as have been killed or disabled in the service.

REMOVER, in law, is where a suit is removed or taken out of one court into another; and is the opposite of remanding a cause, or sending it back into the same court from whence it was first called.

REMPLY, in heraldry, something filled up. The term is chiefly used to denote that the chief is quite filled up with a square piece of another colour, leaving only a bordure of the proper colour of the chief, about the said piece. See plate CCXXIX. fig. 6.

RENAL, something belonging to the reins or kidneys. See the article *KIDNEYS*. For the renal glands, in anatomy, see the article *CAPSULÆ ATRABILIARIÆ*.

RENCOUNTER, in the military art, an engagement of two little bodies or parties of forces; in which sense it stands in opposition to a pitched battle. See the article *BATTLE*.

In single combats, rencounter is used by way of contradistinction to a duel, when persons fall out and fight on the spot, without having premeditated the combat.

RENCOUNTRE, or *RENCONTRE*, in heraldry, is applied to animals when they shew the head in front, with both eyes, &c. or when the face stands right forward, as if they came to meet the person before them.

RENDER, in law, signifies to yield or re-

turn a thing; and it is frequently made use of, in the levying of a fine, which is either single, on which nothing is given or rendered back by the cognisee; or double, containing a grant or render back of rent, &c. out of the land, to the cognisor. In another sense of this word, it is observed, that there are some things in a manor which lie in prender, that is, which may be taken by the lord or his officer, when they happen without any offer made by the tenant, such as *escheats*, &c. and there are some that lie in render, *viz.* such as may be rendered or answered by the tenant, as rents, heriots, and other services.

RENDEZVOUS, or *RENDEVOUS*, a place appointed to meet in, at a certain day and hour.

RENEALMIA, in botany, a genus of the hexandria-monogynia class of plants, the corolla whereof is long, erect, and of the infundibuliform-kind; the tube is of the length of the calyx; the limb is short, plane, and divided into three segments; the fruit is an ovato-oblong capsule, rounded, pointed at the edge and marked with three furrows, formed of three valves, and containing three cells; the seeds are numerous, oblong, and have each a capillary plume.

RENEGATE, or *RENEGADO*, a person who has apostatized or renounced the christian faith, to embrace some other religion, particularly mahometanism.

RENES SUCCENTURIATI, in anatomy, the same with the *capsulæ atrabiliaræ*. See *CAPSULÆ ATRABILIARIÆ*.

RENFREW, a town of Scotland, the capital of the county of Renfrew, situated on the river Clyde, forty-six miles west of Edinburgh.

RENIFORM, something resembling the figure or shape of the kidneys. See the article *KIDNEYS*.

RENITENCY, *renitentia*, among philosophers, that force in solid bodies, whereby they resist the impulse of other bodies, or re-act as much as they are acted on. See the article *RE-ACTION*, &c.

RENNES, a city of France, capital of the province of Britany, situated on the river Villaine: west long. $1^{\circ} 45'$, north lat. $48^{\circ} 5'$.

RENNET. See the article *RUNNET*.

RENT, *reditus*, in law, a sum of money, or other consideration, issuing yearly out of lands or tenements.

Rents are usually distinguished into three kinds, *viz.* rent-service, rent-charge, and

and rent-sec. Rent-service is where a person holds lands of his lord by fealty and certain rent, whilst the reversion of lands continues in the grantor; and if his rent be behind-hand, the landlord may distrain for it, without any covenant, &c. Rent-charge is where a person, by deed, makes over his estate in fee-tail, or for term of life, where the whole interest does pass; yet, by the same deed, reserves to himself a sum of money, to be paid him yearly, with a clause therein, empowering him to distrain in case of non-payment. Rent-sec, or a dry-rent, is that which a person, making over his estate by deed, reserves yearly to be paid him, without any clause of distress contained in the deed.

To these may be added a rent reserved on leases at will, called rents distrainable of common right: but this rent is due by the possession only, which therefore must be proved; whereas in leases for years the rent becomes due on the contract, and the lessee must pay the same, though he never enters on the land. A person may also hold a rent by prescription, as where he and his ancestors have been seised thereof, and used to distrain for it, when in arrears, &c.

RENTAL signifies a roll in which the rents of manors are set down, in order for the lord's bailiff, thereby to collect the same. It contains the lands let to each tenant, with their names, and the several rents arising.

RENTERING, in the manufactories, the same with fine-drawing. See the article FINE-DRAWING.

RENVERSE', INVERTED, in heraldry, is when any thing is set with the head downwards, or contrary to its natural way of standing. Thus, a chevron renversé, is a chevron with the point downwards. They use also the same term when a beast is laid on its back.

RENUENTES, in anatomy, a pair of muscles of the head, thus called as being antagonists to the annuantes, and serving to throw the head backwards.

RENUNCIATION, *renunciatio*, the act of renouncing, abdicating, or relinquishing any right, real or pretended. Renunciations are sometimes express, as by contracts, &c. sometimes tacit, as by contrary acts. To renounce an inheritance, community, &c. is to pass a solemn act before a notary or public officer, whereby a person declares he will not intermeddle in an inheritance or pro-

fit in a company, but surrenders his part and quits all pretensions.

REPAIRING, or REPARATION, *reparatio*, the act of retrieving, mending, or establishing a building or other work damaged or gone to decay. In respect to reparations, if a tenant or lessee covenants that from and after the amendment of the tenements by the lessor he will, at his own charge, keep and leave them in repair, in that case the lessee is not obliged to do the same until the lessor has first made good the reparations; and here if a house be well repaired at first, when the lease began, and afterwards decays, it is said the landlord must put it in repair before the tenant is bound to keep it so.

REPARATIONE FACIENDA, is a writ that lies in divers cases, one of which is where there are tenants in common or joint tenants of a mill or house that is fallen to decay, and one of them is willing to repair the same, but the others will not, in which case the party that is willing to repair it shall have this writ against the persons refusing. Also if a person has a passage over a bridge, and another ought to repair the same, but suffers it to decay, &c. this writ lies.

REPARTEE, or REPARTY, a ready smart reply, especially in matters of wit, humour, or raillery.

REPARTITION, a dividing or sharing a thing a second time.

REPAST, a meal or refectory taken at a stated hour.

In our old law-books it is particularly used for a meal's meat given to servile tenants while at work for their lord.

REPEALING, in law, the revoking or annulling of a statute, or the like. See ABERGATION and REVOCATION.

No act of parliament shall be repealed the same session in which it was made. A deed or will may be repealed for a part, and stand good for the rest. It is held that a pardon of felony may be repealed on disproving the suggestion thereof.

REPEAT, in music, a character shewing that what was last played or sung must be repeated or gone over again. See the article REPETITION.

The repeat serves instead of writing the same thing twice over: there are two kinds of repeats, the great and small; the first is a double bar dotted on each side, or a double bar dotted in the middle, or two parallel lines drawn perpendicularly across the staff, with dots

on either hand. The form of which may be seen under *CHARACTER in music*. This shews that the preceding strain is to be repeated, that is, if it be near the beginning of the piece, all hitherto sung or played is to be repeated; or if towards the end thereof, all from such another mark. In gavots we usually find the repeat at about a third part of the piece. In minutes, borees, courants, &c. towards the end, or in the last strain: some make this a rule, that if there be dots on each side of the bars, they direct a repetition both of the preceding and following strains; if there be only dots on one side the strain, that side alone is to be sung or played over again. The small repeat is when some of the last measures of a strain are to be repeated. This is denoted by a character set over the place where the repeat begins (see *CHARACTER in music*) and continues to the end of the strain.

REPEATING WATCHES. See *WATCH*.
REPEHAM, a market-town of Norfolk, situated eight miles north-west of Norwich.

REPELLENTS, in medicine, remedies which drive back a morbid humour into the mass of blood from which it was unduly secreted. To understand rightly, says Quincy, the operation of repellents, it may be observed, that these are medicines which prevent such an afflux of a fluid to any particular part as would raise it into a tumour; but to know how this may be effected, we must advert, that all tumours arise either from an increase in the velocity or quantity of the fluids, or a weakness in some particular part; and sometimes both concur. An increase in the velocity of the fluids makes them more forcibly push against and distend all the parts in their circuit. If, therefore, any part be unequally pressed or relaxed by external injuries, that will be more elevated than any other, and for want of equal resistance with the rest of the body, will at length receive such a quantity of fluid as will raise it into a tumour, especially if any of its vessels be obstructed; because the protrusion of fresh matter a tergo, will continue to add thereto until the part is upon the utmost stretch, and can hold no more. In this case all those means are said to be repellent which check the growth of the tumour, and assist the resurgent blood in taking up the obstructed matter, and washing it again into the common stream. This intention is chiefly answered by evacuation and revulsion;

for whatever lessens the quantity of the fluid, will diminish the force upon the tumified part. A medicine comes to be repellent by consisting of such subtil parts as may transmit some of them through the pores, and help to render the obstructed matter more fluid, so that it comes the more easy to be loosened, and fall again into the circulating current. But in this case there is a hazard of such things likewise putting the obstructed humour into a ferment, whereby it sooner turns into pus, and then comes under the denomination of suppuratives or ripeners. What, therefore, in the most strict sense, is to be reputed a repeller, is that which astringes and strengthens the part so as to make it resist any such lodgment. These are such whose qualities are most manifest in their coldness and drying properties; but there are so few instances wherein bandage is not better than any such application, that very little comes to be used for that purpose. In hæmorrhages and ouings out of serum, so as to deform the skin, simples of this nature mostly take place, which answer their ends by astringing the fibres, whence those apertures are so closed as not to admit through them afterwards any such fluid. See *TUMOUR*, &c. The most remarkable in the class of repellents are the white of an egg, the lapis calaminaris, litharge of gum, red-lead, tutty, pampholyx, house-leek, putty, and cowweb. See the article *EGG*, &c.

REPELLING POWER, *vis repellens*, in physics. See the article *REPULSION*.

REPERCUSSION, in mechanics. See the article *REFLECTION*.

REPERCUSSION, in music, a frequent repetition of the same sound. See the article *REPETITION*.

This often happens in the modulation, where the essential chords of each mode of the harmonical triad are to be struck oftener than the rest: and of these three chords the two extremes, *i. e.* the final and the predominant one (which are properly there percussions of each mode) oftener than the middle one.

REPERTORY, *repertorium*, a place wherein things are orderly disposed, so as to be easily found when wanted. The indices of books are repertories, shewing where the matters sought for are treated of. Common-place books are also kinds of repertories.

REPETITION, *repetitio*, the reiterating of an action.

REPETITION, in music, denotes a reiterating

ing or playing over again the same part of a composition, whether it be a whole strain, part of a strain, or double strain, &c. The repetition is denoted by a character called a repeat, which is varied so as to express the various circumstances of a repeat. See the article REPEAT.

When the song ends with a repetition of the first strain, or part of it, the repetition is denoted by *da capo*, or D. C. *i. e.* from the beginning.

Repetition or reply is also used in music when after a little silence one part repeats or runs over the same notes, the same intervals, the same motions, and, in a word, the same song which a first part had already gone over during the silence of this, and is nearly the same with figure. See FIGURE and IMITATION.

Repetition, or reply, is also a doubling trebling, &c. of an interval or reiteration of some consonance or dissonance, as a fifteenth is a repetition of the octave, *i. e.* double octave, or second octave. See the articles OCTAVE and INTERVAL.

REPETITION, in rhetoric, a figure which gracefully and emphatically repeats either the same word, or the same sense in different words.

In the use of this figure care is to be used that we run not into insipid tautologies, nor affect a trifling sound and chime of insignificant words. All turns and repetitions are so that do not contribute to the strength and lustre of the discourse, or at least one of them. The nature and design of this figure is to make deep impressions on those we address. It expresses anger and indignation, full assurance of what we affirm, and a vehement concern for what we have espoused.

REPLANTING, in gardening, the act of planting a second time. See PLANTING.

REPLEADER, *replacitare*, in law, is to plead over again what was once pleaded before.

REPLEGIARE, in law, signifies to redeem a thing taken or detained by another, by putting in legal sureties.

REPLEGIARE DE AVERIIS, is a writ which is brought by him whose cattle is distrained or impounded for any cause by another person, on security being given to the sheriff to prosecute or answer the action at law.

REPLETION, in medicine, a plenitude or plethora. See PLETHORA.

Repletion is more dangerous than inanition. Bleeding and diet are the great

resources whence a person is incommoded with a repletion.

Repletion is sometimes also used where the stomach is overladen with too much eating or drinking. The physicians hold all repletion to be prejudicial, but that of bread is of all others the worst.

REPLETION, in the canon law, is where the revenue of a benefice or benefices is sufficient to fill or occupy the whole right or title of the graduate who holds them. Where there is a repletion, the party can demand no more by virtue of his degrees. In England, where benefices are not appropriated to degrees, repletion, strictly speaking, has no place.

REPLEVIN, in law, a remedy granted on a distress, by which the first possessor has his goods restored to him again, on his giving security to the sheriff that he will pursue his action against the party distraining, and return the goods or cattle, if the taking them shall be adjudged lawful.

In a replevin the person distrained becomes plaintiff, and the person distraining is called the defendant or avowant, and his justification an avowry.

At the common law replevins are by writ, either out of the king's bench or common pleas; but by statute, they are by plaint in the sheriff's court, and court-baron, for a person's more speedily obtaining the goods distrained.

If a plaint in replevin be removed into the court of king's bench, &c. and the plaintiff makes default and becomes nonsuit, or judgment is given against him, the defendant in replevin shall have the writ of retorno habendo of the goods taken in distress. See REPLEVY.

REPLEVISH, in law, signifies to admit one to mainprise upon surety, See the article MAINPRISE.

REPLEVY, in law, is a tenant's bringing a writ of replevin, or replegiari facias, where his goods are taken by distress for rent; which must be done within five days after the distress, otherwise at the five days end, they are to be appraised and sold. 2 W. and M. c. 5.

This word is also used for bailing a person, as in the case of a homine replegiando.

REPLICATION, in logic, the assuming or using the same term twice in the same proposition.

REPLICATION, in the courts of common law, signifies an exception or answer made

by the plaintiff to the defendant's plea; in the court of chancery, it is what the complainant replies to the defendant's answer.

REPORT, the relation made upon oath, by officers or persons appointed to visit, examine, or estimate the state, expences, &c. of any thing.

REPORT, in law, is a public relation of cases judicially argued, debated, resolved or adjudged in any of the king's courts of justice, with the causes and reasons of the same, as delivered by the judges. Also when the court of chancery, or any other court, refers the stating of a case, or the comparing of an account to a master of chancery, or other referee, his certificate thereon is called a report.

REPOSE, in poetry, &c. the same with rest and pause. See **REST**, &c.

REPOSE, in painting, certain masses or large assemblages of light and shade, which being well conducted, prevent the confusion of objects and figures, by engaging and fixing the eye so as it cannot attend to the other parts of the painting for some time; and thus leading it to consider the several groups gradually, proceeding, as it were, from stage to stage.

REPOSITORY, a stone house, or place in which things are laid up, and preserved. In this sense we say, the repository of the royal society. See **MUSEUM**.

REPRESENTATION, in the drama, the exhibition of a theatrical piece, together with the scenes, machines, &c.

REPRESENTATIVE, one who personates or supplies the place of another, and is invested with his right and authority. Thus the house of commons are the representatives of the people in parliament. See **PARLIAMENT**.

REPRIEVE, or **REPRIVE**, in law, is suspending or deferring the execution of the law upon a prisoner for a certain time; or a warrant from the king for deferring the execution of a person condemned. Every judge, who has the power of passing sentence on criminals, has also the power to reprieve them: but in London, no person convicted of felony can be reprieved without the king's warrant. However, where a woman is condemned for treason or felony, and, upon pleading her belly, is found to be quick with child, execution is of course respited, and the woman becomes reprieved till her delivery: but this favour can only be granted once. The execution of offenders

is frequently stayed by reprieve, upon condition of transportation.

REPRISALS, a right which princes claim of taking from their enemies any thing equivalent to what they unjustly detain from them.

Reprisals is also used for a letter of marque granted by a prince to his subject. See the article **MARQUE**.

REPRISE, or **REPRIZE**, at sea, is a merchant ship which, after its being taken by a corsair, privateer, or other enemy is retaken by the opposite party.

If a vessel thus retaken has been twenty four hours in the possession of the enemy it is deemed a lawful prize; but if it be retaken within that time, it is to be restored to the proprietor, with every thing therein, upon his allowing one third to the vessel who made the reprise. Also if the reprise has been abandoned by the enemy, either in a tempest or from any other cause, before it has been led into any port, it is to be restored to the proprietor.

REPRIZES, in law, are deductions or payments annually made out of a manor or lands; as rent-charges, pensions, annuities, &c.

REPROBATION, in theology, a decree by which God is supposed either from all eternity, or from the creation of the world, to consign over to eternal misery the greatest part of mankind, and to save none of the human race, except those whom he made the heirs of glory by election.

Casuits distinguish two kinds of reprobation, positive and negative. Positive reprobation, is that by which God is supposed to create men with a positive and absolute resolution to damn them eternally: and negative reprobation, is that whereby God, though he creates all men with a sincere desire to save them, and furnishes them with all the necessary means of salvation, so that all may be saved that will; yet sees there are several who will not do it, with the aids he shall afford them, and sees at the same time, they would do it with certain other aids, which he sees, but will not give them.

REPRODUCTION, the act whereby a thing is produced anew, or grows a second time.

The reproduction of several parts of lobsters, crabs, &c. is one of the greatest curiosities in natural history. It seems, indeed, inconsistent with the modern system of generation, which supposes the animal

animal to be wholly formed in the egg ; that, in lieu of an organical part of an animal cut off, another should arise perfectly like it : the fact, however, is too well attested to be denied. The legs of lobsters, &c. consist each of five articulations ; now when any of the legs happen to break, by any accident, as by walking, &c. which frequently happens, the fracture is always found to be at the future near the fourth articulation ; and what they thus lose, is exactly reproduced in some time afterwards ; that is, a part of the leg shoots out, consisting of four articulations, the first whereof has two claws, as before ; so that the loss is entirely repaired.

If the leg of a lobster be broken off by design at the fourth or fifth articulation, what is thus broke off is always reproduced. But, if the fracture be made in the first, second, or third articulation, the reproduction is not so certain. And it is very surprizing, that, if the fracture be made at these articulations, at the end of two or three days, all the other articulations are generally found broke off to the fourth, which, it is supposed, is done by the creature itself, to make the reproduction certain. The part reproduced is not only perfectly similar to that retrenched, but also, in a certain space of time, grows equal to it. Hence it is that we frequently see lobsters, which have their two large legs unequal, in all proportions. And, if the part reproduced be broken off, a second will succeed.

REPTILES, in natural history, a kind of animals denominated from their creeping or advancing on the belly. Or reptiles are a genus of animals and insects, which, instead of feet, rest on one part of the body, while they advance forward with the rest.

Such are earthworms, snakes, caterpillars, &c. Indeed, most of the class of reptiles have feet ; only those very small, and the legs remarkably short in proportion to the bulk of the body.

Naturalists observe a world of artful contrivance for the motion of reptiles. Thus, particularly in the earth-worm, Dr. Willis tells us, the whole body is only a chain of annular muscles ; or, as Mr. Derham says, it is only one continued spiral muscle, the orbicular fibres whereof being contracted, render each ring narrower and longer than before ; by which means it is enabled, like the worm

of an augre, to bore its passage into the earth. Its reptile motion might also be explained by a wire wound on a cylinder, which when slipped off, and one end extended and held fast, will bring the other near to it. So the earth-worm having shot out and extended his body (which is with a wreathing) it takes hold by these small feet it hath, and so contracts the hinder part of its body. Dr. Tyson adds, that when the forepart of the body is stretched out, and applied to a plane at a distance, the hind part relaxing and shortening is easily drawn towards it as a center.

Its feet are disposed in a quadruple row the whole length of the worm, with which, as with so many hooks, it fastens down sometimes this and sometimes that part of the body to the plane, and at the same time stretches out or drags after it another.

The creeping of serpents is effected after a somewhat different manner ; there being a difference in their structure, in that these last have a compages of bones articulated together.

The body here is not drawn together, but as it were complicated ; part of it being applied on the rough ground, and the rest ejaculated and shot from it, which, being set on the ground in its turn, brings the other after it. The spine of the back variously wreathed has the same effect in leaping, as the joints in the feet of other animals ; they make their leaps by means of muscles, and extend the plicæ or folds.

REPTILE is also used, by some botanical writers, to signify plants which creep upon the earth, unless sustained by some other plant, prop, &c. As cucumbers, melons, the vine, &c.

REPUBLIC, *respublica*, commonwealth, a popular state or government ; or a nation where the people have the government in their own hands.

REPUBLIC of letters, a phrase used collectively of the whole body of the people of study and learning.

REPUDIATION, *repudium*, in the civil law, the act of divorcing. See **DIVORCE**.

REPULSION, *repulsio*, in physics, that property in bodies, whereby, if they are placed just beyond the sphere of each other's attraction of cohesion, they mutually fly from each other.

Thus if an oily substance, lighter than water, be placed on the surface thereof, or if a piece of iron be laid upon mercury,

cury, the surface of the fluid will be depressed about the body laid on it: this depression is manifestly occasioned by a repelling power in the bodies, which hinders the approach of the fluid towards them. But it is possible, in some cases, to press or force the repelling bodies into the sphere of one another's attraction; and then they will mutually tend toward each other, as when we mix oil and water till they incorporate.

Dr. Knight defines repulsion to be that cause which makes bodies mutually endeavour to recede from each other, with different forces, at different times; and that such a cause exists in nature, he thinks evident for the following reasons, 1. Because all bodies are electrical, or capable of being made so; and it is well known, that electrical bodies both attract and repel. 2. Both attraction and repulsion are very conspicuous in all magnetical bodies. 3. Sir Isaac Newton has shewn from experiments, that the surfaces of two convex glasses repel each other. 4. The same great philosopher has explained the elasticity of the air, by supposing its particles mutually to repel each other. 5. The particles of light are, in part at least, repelled from the surfaces of all bodies. 6. Lastly, it seems highly probable, that the particles of light mutually repel each other, as well as the particles of air.

The same gentleman ascribes the cause of repulsion, as well as that of attraction, to the immediate effect of God's will; and as attraction and repulsion are contraries, and consequently cannot, at the same time, belong to the same substance, the doctor supposes there are in nature two kinds of matter, one attracting, the other repelling; and that those particles of matter which repel each other, are subject to the general law of attraction in respect of other matter. A repellent matter being thus supposed, equally dispersed through the whole universe, the doctor attempts to account for many natural phenomena by means thereof. He thinks light is nothing but this repellent matter put into violent vibrations, by the repellent corpuscles which compose the atmosphere of the sun and stars; and that, therefore, we have no reason to believe they are gulphs of fire, but, like the rest of the heavenly bodies, inhabitable worlds. From the same principles, he attempts to explain the nature of fire and heat, the various phenomena

of the magnet, and the cause of the variation of the needle: and, indeed, it is difficult, if not impossible, by the doctrine of attraction alone, to account for all the phenomena observable in experiments made with magnets, which may now be solved by admitting this doctrine of a repellent fluid; but whether it will be sufficient to account for all the particular phenomena of nature, which are the proper tests of an hypothesis, time and experience alone must determine.

The doctor also endeavours to shew, that the attractions of cohesion, gravity and magnetism are the same, and that by these two active principles, *viz.* attraction and repulsion, all the phenomena of nature may be explained; but as his ingenious treatise on this subject is laid down in a series of propositions, all connected together, it would be impossible to do justice to his arguments, without transcribing the whole; we shall therefore refer the curious to the book itself. According to 'sGravesande and others, when light is reflected from a polished spherical surface, the particles of light do not strike upon the solid parts, and so rebound from them; but are repelled from the surface, at a small distance before they touch it, by a power extended all over the said polished surface. And Sir Isaac Newton observes, that the rays of light are also expelled by the edges of bodies, as they pass near them; so as to make their shadows, in some cases, larger than they would otherwise be. See 'sGravesande's *Introd. P. I. n° 40 to 44.* and Sir Isaac Newton's *Optics, B. II. P. III. prop. 8.* and *B. III. P. I.* where this repulsive force is illustrated from other phenomena.

REQUENA, a town of New Castile, forty-five miles west of Valencia.

REQUEST, in law, a supplication or petition preferred to a prince, or to a court of justice; begging relief in some conscientious cases where the common law grants no immediate redress.

Court of REQUESTS, an antient court of equity, instituted about the nineteenth year of Henry VII. See **COURT**.

In the fortieth and forty-first years of queen Elizabeth, it was adjudged upon solemn argument, in the court of common pleas, that the court of request was then no court of equity.

REQUIEM, in the romish church, a mass sung for the rest of the soul of a person deceased. See the article **MASS**.

RESAR-

RESARCELE, in heraldry, is where a slender crose is charged upon another, as represented in plate CCXXXI. fig. 4.

RESCUIT, *receptio*, in law, an admission or receiving of a third person to plead his right, in a cause formerly commenced between the other two.

RESCHET, the capital of the province of Gilan, in Persia, situated on the south-west coast of the Caspian sea.

RESCISSION, *rescissio*, in the civil law, an action intended for the annulling, or setting aside, any contract, deed, &c.

RESCOUS, or **RESCUE**, in law, an illegal taking away and setting at liberty a distress taken, or a person arrested, by process, or course of law. See the article **DISTRESS**, &c.

Rescous, in matters relating to treason, is deemed treason; and in matters concerning felony, is felony.

RESCRIPT, *rescriptum*, an answer delivered by an emperor, or a pope, when consulted by particular persons, on some difficult question, or point of law; to serve as a decision thereof.

RESEARCH, a scrutiny, or diligent enquiry into any thing.

RESEARCH, in music, is a kind of prelude or voluntary played on the organ, &c. wherein the performer seems to search or look out for the strains and touches of harmony, which he is to use in the regular piece to be played afterwards. See the article **PRELUDE**.

RESEARCHING, in sculpture, the repairing of a cast figure, &c. with proper tools; or the finishing it with art and exactness, so as the minutest parts may be well defined.

RESEDA, **BASE-ROCKET**, in botany, a genus of polyandria-trigynia class of plants, the corolla of which consists of certain unequal petals, some one of which is always femitrid; and its fruit is a gibbose and angulated capsule, containing one cell, with numerous kidney-shaped seeds.

RESERVATION, in law an action or clause whereby something is reserved, or secured to one's self.

Mental **RESERVATION**, a proposition which strictly taken, and according to the natural import of the terms, is false; but, if qualified by something concealed in the mind, becomes true.

Mental reservations are the great refuge of religious hypocrites, who use them to accommodate their consciences with their interests; the jesuits are zealous advo-

cates for mental reservations; yet are they real lyers, as including an intention to deceive.

RESERVE, in law, the same with reservation. See the article **RESERVATION**.

Body of **RESERVE**, or *corps de* **RESERVE**, in military affairs, the third or last line of an army, drawn up for battle; so called because they are reserved to sustain the rest, as occasion requires; and not to engage, but in case of necessity.

RESERVOIR, a place where water is collected and reserved, in order to be conveyed to distant places through pipes, or supply a fountain, or jet d'eau.

RESET, in law, the receiving or harbouring an outlawed person. See the article **OUTLAWRY**.

RESIDENCE, in the canon and common law, the abode of a person, or incumbent, upon his benefice; and his assiduity in attending on the same.

RESIDENT, a public minister, who manages the affairs of a kingdom or state, at a foreign court.

They are a class of public ministers inferior to ambassadors or envoys; but, like them, are under the protection of the law of nations.

RESIDENTIARY, *residentiarius*, a canon installed into the privileges and profits of residence.

RESIDUAL FIGURE, in geometry, the figure remaining after subtracting a lesser from a greater.

RESIDUAL ROOT, in algebra, a root composed of two parts or members, connected together by the sign —.

Thus $x - y$ is a residual root, so called, because its value is no more than the difference between its parts x and y .

RESIDUE, *residuum*, the remainder or balance of an account, debt, or obligation.

RESIGNATION, in the canon law, the surrendering a benefice into the hands of the collator, or bishop.

RESIGNEE, in law, the person to whom a thing is resigned.

RESIN, in natural history, a viscid juice oozing either spontaneously, or by incision, from several trees, as the pine, fir, &c. For the difference between resins and gums, see the article **GUM**.

Natural resins are either solid or fluid. Of the solid resins, some are used more frequently in medicine, as storax, benjamin, mastich, olibanum, elmi, lac, dragons-blood, and camphor; and others more rarely, as anise, copal, caranna, tachamahaca, laudanum, sandarach, &c.

See

See the articles *STORAX*, *BENJAMIN*, &c. The liquid raisins, used in medicine, are less numerous, *viz.* balsam of gilead, of peru, of tolu, of capivi, turpentine, liquid amber, and liquid storax. See the articles *BALSAM*, *TURPENTINE*, &c.

All resins are used, more or less, in all official plasters; both as being ripeners and drawers, and because they give a due consistence and tenacity.

The resins of vegetables may be prepared nearly in the same manner as extracts, by using rectified spirit of wine instead of water: for such a spirit is the only proper menstruum that will dissolve the grosser resinous matter of vegetables, as water is of the mucilaginous and saline parts; yet these principles are so intimately combined in almost all plants, that whichever of these liquors is applied at first, it will take up a portion of what is directly soluble only in the other: hence sundry vegetables, extremely resinous, and whose virtues consist chiefly in their resin, afford nevertheless very useful extracts with water, though not equal to those obtained by a prudent application of spirit. See *EXTRACT*.

The indissolubility of pure resins in aqueous fluids, and their tenacious quality by which they stick to the coats of the intestines, occasion gripes and other inconveniencies; so that it is not safe to give them alone: the better way of fitting them for internal use, is by triturating them with the testaceous powders, or with almonds, into the form of an emulsion; or by dissolving them in spirit of wine, and mixing the solution with a proper quantity of syrup. Six or eight grains of the resin of jalap, or scammony, managed in this manner, prove powerfully cathartic without griping, or greatly disordering the body.

For the preparation of the resins, see the articles, *JALAP*, *SCAMMONY*, &c.

RESISTANCE, or **RESISTING FORCE**, in philosophy, denotes, in general, any power which acts in an opposite direction to another, so as to destroy or diminish its effect.

Hence the force wherewith bodies, moving in fluid mediums, are impeded or retarded, is the resistance of those fluids. See the article *FLUID*.

Authors have established it as a certain rule, that, whilst the same body moves in the same medium, it is always resisted in the duplicate proportion of its velocity; that is, if the resisted body move in one

part of its track, with three times the velocity with which it moved in some other part, then its resistance to the greater velocity will be nine times the resistance to the lesser: if the velocity in one place be four times the velocity in another, the resistance to the greater velocity will be sixteen times the resistance to the lesser, and so on. This rule, though excessively erroneous, when taken in a general sense, is yet undoubtedly very near the truth, when confined within certain limits.

In order to conceive the resistance of fluids to a body moving in them, Mr. Robins distinguishes between those fluids, which being compressed by some incumbent weight, perpetually close up the space deserted by the body in motion, without permitting, for an instant, any vacuity to remain behind it; and those fluids in which, they being not sufficiently compressed, the space left behind the moving body remains for some time empty. These differences, in the resisting fluids, will occasion very remarkable varieties in the laws of their resistance, and are absolutely necessary to be considered in the determination of the action of the air in shot and shells; for the air partakes of both these affections, according to the different velocities of the projected body.

If a fluid was so constituted that all the particles composing it were at some distance from each other, and there was no action between them, then the resistance of a body moving therein, would be easily computed from the quantity of motion communicated to these particles: for instance, if a cylinder moved in such a fluid in the direction of its axis, it would communicate to the particles it met with a velocity equal to its own, and in its own direction, supposing that neither the cylinder, nor the parts of the fluid were elastic; whence, if the velocity and diameter of the cylinder be known, and also the density of the fluid, there would thence be determined the quantity of motion communicated to the fluid, which (action and re action being equal) is the same with the quantity lost by the cylinder, consequently the resistance would be hereby ascertained.

In this kind of discontinued fluid, the particles being detached from each other, every one of them can pursue its own motion in any direction, at least for some time, independent of the neighbouring ones; wherefore, if instead of a cylinder

hinder moving in the direction of its axis, a body, with a surface oblique to its direction, be supposed to move in such a fluid, the motion the parts of the fluid will hereby acquire, will not be in the direction of the resisted body, but perpendicular to its oblique surface; whence the resistance to such a body will not be estimated from the whole motion communicated to the particles of the fluid, but from that part of it only which is in the direction of the resisted body. In fluids then, where the parts are thus discontinued in each other, the different obliquities of that surface, which goes foremost, will occasion considerable changes in the resistance; although the section of the solid, by a plain perpendicular to its direction, should in all cases be the same. And Sir Isaac Newton has particularly determined, that in a fluid thus constituted, the resistance of a globe is but half the resistance of a cylinder of the same diameter, moving in the direction of its axis with the same velocity. But though the hypothesis of a fluid, thus constituted, be of great use in explaining the nature of resistances; yet, in reality, no such fluid does exist within our knowledge: all the fluids with which we are conversant are so formed, that their particles either lie contiguous to each other, or at least act on each other in the same manner as if they did; consequently, in these fluids, no one particle, contiguous to the resisted body, can be moved, without moving at the same time a great number of others, some of which will be distant from it; and the motion thus communicated to a mass of the fluid will not be in any one determined direction, but will in each particle be different, according to the different manners in which it lies in contact with those, from which it receives its impulse; whence, great numbers of the particles, being diverted into oblique directions, the resistance of the moving body, which will depend on the quantity of motion communicated to the fluid in its own direction, will be hereby different in quantity, from what it would be in the preceding supposition, and its estimation becomes much more complicated and operose. Sir Isaac Newton, however, has determined, that the resistance to a cylinder, moving in the direction of its axis in such a compressed fluid as we have here treated of, is but one fourth part of the resistance, which

the same cylinder would undergo, if it moved with the same velocity, in a fluid, constituted in the manner we have described in our first hypothesis, each fluid being supposed to be of the same density. But again, it is not only in the quantity of their resistance that these fluids differ, but likewise in the different manner in which they act on solids of different forms moving in them.

We have shewn, that in the discontinued fluid, which we first described, the obliquity of the foremost surface of the moving body would diminish the resistance; but in compressed fluids this holds not true, at least not in any considerable degree; for the principal resistance in compressed fluids arises from the greater or lesser facility, with which the fluid, impelled by the forepart of the body, can circulate towards its hindermost part; and this being little, if at all, affected by the form of the moving body, whether it be cylindrical, conical, or spherical, it follows, that while the transverse section of the body, and consequently the quantity of impelling fluid is the same, the change of figure in the body will scarcely affect the quantity of its resistance.

The resistance of bodies of different figures, moving in one and the same medium, has been considered by Mr. J. Bernoulli in the *Acta Lipsiens.* for May, 1693; and the rules he lays down, on this subject are the following: 1. If an isosceles triangle be moved in the fluid according to the direction of a line which is normal to its base; first with the vertex foremost, and then with its base; the resistances will be as the legs, and as the square of the base, and as the sum of the legs. 2. The resistance of a square moved according to the direction of its side, and of its diagonal, is as the diagonal to the side. 3. The resistance of a circular segment (less than a semi-circle) carried in a direction perpendicular to its basis, when it goes with the base foremost, and when with its vertex foremost (the same direction and celerity continuing, which is all along supposed) is as the square of the diameter to the same, less one third of the square of the base of the segment. Cor. Hence the resistances of a semi-circle, when its base, and when its vertex go foremost, are to one another in a sesquialterate ratio. 4. A parabola moving in the direction of its axis, with its basis,

basis, and then its vertex foremost, has its resistances, as the tangent to an arch of a circle, whose diameter is equal to the parameter, and the tangent equal to half the basis of the parabola. 5. The resistances of an hyperbola, or the semi-ellipsis, when the base and when the vertex goe foremost, may be thus computed; let it be, as the sum, or difference, of the transverse axis, and latus rectum, is to the transverse axis, so is the square of the latus rectum to the square of the diameter of a certain circle; in which circle apply a tangent equal to half the basis of the hyperbola or ellipsis. Then say again, as the sum, or difference, of the axis and parameter is to the parameter, so is the aforesaid tangent to another right line. And further, as the sum, or difference, of the axis and parameter is to the axis, so is the circular arch, corresponding to the aforesaid tangent, to another arch. This done, the resistances will be as the tangent to the sum, or difference, of the right line thus found, and that arch last mentioned.

6. In general, the resistances of any figure whatsoever going now with its base foremost, and then with its vertex, are as the figures of the basis to the sum of all the cubes of the element of the basis divided by the squares of the element of the curve line.

All which rules, he thinks, may be of use in the fabric or construction of ships, and in perfecting the art of navigation universally. As also for determining the figures of the balls of pendulums for clocks. See the article SHIP, &c.

As to the resistance of the air, Mr. Robins, in his new principles of gunnery, took the following method to determine it: he charged a musket-barrel three times successively with a leaden ball $\frac{3}{4}$ of an inch diameter, and took such precaution in weighing of the powder, and placing it, as to be sure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1" from its medium quantity. He then fired it against a pendulum, placed at 25, 75, and 125 feet distance, &c. from the mouth of the piece respectively. In the first case it impinged against the pendulum with a velocity of 1670 feet in 1"; in the second case with a velocity of 1550 feet in 1"; and in the third case with a velocity of 1425 feet in 1"; so that in passing through 50 feet of air, the bullet lost a velocity of about 120,

or 125 feet in 1"; and the time of its passing through that space being about $\frac{1}{32}$ or $\frac{1}{30}$ of 1", the medium quantity of resistance must, in these instances, have been about 120 times the weight of the ball; which as the ball was nearly $\frac{1}{12}$ of a pound, amounts to about 10 lb. avoirdupoise.

Now if a computation be made, according to the method laid down for compressed fluids in the 38th Propos. of lib. 2. of Sir Isaac Newton's Principia, (supposing the weight of water to be to the weight of air, as 850 to 1, it will be found that the resistance of a globe of three quarters of an inch diameter, moving with a velocity of about 1600 feet in 1", will not, on those principles, amount to any more than a force of $4\frac{1}{8}$ lb. avoirdupoise; whence we may conclude (as the rules in that proposition for slow motions are very accurate) that the resisting power of the air in slow motions is less than in swift motions, in the ratio of $4\frac{1}{8}$ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again charging the same piece with equal quantities of powder, and balls of the same weight, and firing three times at the pendulum, placed at 25 feet distance from the mouth of the piece, the medium of the velocities with which the ball impinged was 1690 feet in 1". Then removing the piece, 175 feet from the pendulum, the velocity of the ball, at a medium of five shots, was 1300 feet in 1". Whence the ball, in passing through 150 feet of air, lost a velocity of about 390 feet in 1"; and the resistance, computed from these numbers, comes out something more than in the preceding instance, amounting to between 11 and 12 pounds avoirdupoise: whence, according to these experiments, the resisting power of the air to swift motions is greater than in slow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments.

Having thus ascertained the resistance to a velocity of near 1700 feet in 1", he next proceeded to examine this resistance in smaller velocities: the pendulum being placed at 25 feet distance, was fired at five times, and the mean velocity with which the ball impinged was 1180 feet in 1". Then removing the pendulum to the distance of 250 feet, the medium velocity of five shot at this distance, was 959 feet in 1"; whence the ball, in passing

ling through 225 feet of air, lost a velocity of 230 feet in 1", and as it passed through that interval in about $\frac{3}{11}$ of 1", the resistance to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2 lb. 10 oz. avoirdupoise. Now the resistance to the same velocity, according to the laws observed in slower motions, amounts to $\frac{7}{11}$ of the same quantity; whence in a velocity of 1065 feet in 1", (the medium of 1180 and 950) the resisting power of the air is augmented in no greater proportion than of 11 to 7; whereas in greater degrees of velocity, as before, it amounted very near the ratio of 3 to 1.

That this resisting power of the air to swift motions, is very sensibly increased beyond what Sir Isaac's theory for slow motions makes it, seems hence to be evident. It being, as has been said, in musket, or cannon shot, with their full charge of powder, near three times the quantity assigned by that theory.

The resistance of a bullet of three quarters of an inch diameter, moving in air with a velocity of 1670 feet in 1", amounting, as we said, to 10 lb. the resistance of a cannon ball of 24 lb. fired with its full charge of powder, and thereby moving with a velocity of 1650 feet in 1", may hence be determined. For the velocity of the cannon ball being near the same as the musket bullet, and its surface above 54 times greater, it follows, that the resistance on the cannon ball will amount to more than 540 lb. which is near 23 times its own weight. And from hence it appears how rash and erroneous the opinion of those is, who neglect the consideration of the resistance of the air as of no importance in the doctrine of projectiles. See the articles PROJECTILES and GUNNERY.

RESISTANCE of the fibres of solid bodies is more properly called cohesion: See the article COHESION.

Solid of least **RESISTANCE**. See SOLID.

RESOLUTION, in chemistry, &c. the reduction of a mixed body into its component parts, or first principles, by a proper analysis. See the articles MENSTRUUM and SOLUTION.

The resolution of bodies is effected by divers operations, as distillation, sublimation, fermentation, precipitation, &c. See the articles DISTILLATION, SUBLIMATION, &c.

Some logicians use the term resolution

for what is more usually called analysis, or the analytic method. See the articles ANALYSIS and METHOD.

RESOLUTION, in medicine, that coction or alteration of the crude peccant matter of any disease, either by the natural strength of the patient, or of its own accord, or by the application of remedies, whereby its bulk, figure, cohesion, &c. are so far changed, as that it ceases to be morbid, and becomes laudable. This Boerhaave observes, is of all others the most perfect cure, where it is effected without any evacuation, as supposing the matter favourable, the constitution excellent, and the medicines good.

RESOLUTION, in music, is when a canon or perpetual fugue is not wrote on a line, or in one part, but all the voices that are to follow the guide or first voice are wrote separately either in score, that is in separate lines, or in separate parts, with the pauses each is to observe, and in the proper tone to each.

RESOLVENTS, *resolventia*, in medicine, remedies proper to resolve and dissipate tumors and gatherings, to soften indurations, and, by their tenuity and warmth, evacuate redundant and peccant humours through the pores. Under this class come various unguents, emplasters, &c.

RESONANCE, **RESONDING**, in music, &c. a sound returned by the air, inclosed in the bodies of stringed musical instruments, as lutes, &c. or even in the bodies of wind instruments, as flutes, &c. See SOUND and MUSIC.

Elliptic and parabolic vaults, resound strongly, that is, they will reflect or return a sound. The mouth and the parts thereof, as the palate, tongue, teeth, nose, and lips, Monsieur Dodart observes, contribute nothing to the tone of the voice, but their effect is very great as to the resonance: of this we have a very sensible instance in that vulgar instrument called a jews-harp, or trompe de Bearn; for if you hold it in your hand, and strike the tongue or spring thereof, which is the method practised to sound this instrument, it yields scarce any noise, but holding the body of it between the teeth, and striking it as before, it makes a musical buzz, which is heard at a good distance, and especially the lower notes.

So also in the haut-boys, the tune of the reed is always the same; being a sort of drone, the chief variety whereof is in

the tune of resonance produced in the mouth, by the greater or less aperture, and the various motions of the lips.

RESORT, or **RESSORT**. See **RESSORT**.

RESPECTU COMPUTI VICECOMITIS HABENDO, in law, a writ directed to the treasurer and barons of the exchequer for the respiting of a sheriff's account.

RESPIRATION, *respiratio*, the act of respiring, or breathing the air. What respiration is, and why it is uninterruptedly carried on without the concurrence of the mind, will appear from the following considerations of Boerhaave. The lungs suspended in the air, which every where acts upon them, and equally presses them always, collapse, contract themselves into a smaller space, and become much less than when they remained in the intire thorax. This is principally performed by the contractile force of the muscular fibres, which connect the squamous segments of the bronchia. If the lungs thus contracted, are filled with air, forcibly blown through the glottis, they are so distended as in bulk not only to equal that which they had in the intire thorax, but even to exceed it; all which is sufficiently certain from experiments. The same thing happens if, when an access for the air through the glottis is left to the lungs, the air, externally acting on the lungs, is either removed, or its pressure diminished. Hence it is obvious, that the lungs, by their proper force have always a tendency to become less in all their parts than they are when placed in the intire thorax. For this reason, it is certain that they are in a continual state of distraction so long as a person is alive, so that they must collapse, and be diminished, whilst the whole of the animal remains in a vacuum, obtained by an exhaustion of the air in an air-pump. For there is nothing similar to a circumambient air between the external membrane of the lungs, and all the internal surface of the pleura in a sound person; nothing therefore externally compresses the lungs, except the diaphragm. There is, however, always an internal air contained in them, and freely conveyed to them through the glottis. Hence the lungs are always somewhat more distended by the internal, than they are compressed by the external, air, the access of which is hinder-

ed by the diaphragm, which is so connected with the ribs and vertebræ, that the air cannot enter the thorax in such a manner as would be requisite for an equilibrium. See the article **LUNGS**, **DIAPHRAGM**, &c.

Since, therefore, in inspiration, a greater quantity of air enters the lungs through the glottis, it will extend the lungs more, and overcome their natural force, so that in this action the lungs are passive; but how far they are active is only to be discovered from certain phenomena. In vital inspiration, then, especially considered in a sleeping person, first the ribs, particularly the nine superior ones, articulated at the vertebræ, and by cartilages joined to the sternum, with their arched part, rise to the clavicles, so that this motion is principally observed in the middle of the arch, whilst three, or perhaps four, inferior ribs are turned downwards, backwards, and obliquely outwards, but in such a manner that the seventh, eighth, ninth, and tenth ribs are by their cartilaginous segments, as it were, drawn inwards. Secondly, the whole abdomen, to the very end of inspiration, is gradually rendered more tumid and pressed downwards. Thirdly, at the same time the cavity of the thorax is enlarged, as is obvious from repeated experiments.

Whilst the parts remain in this situation, the air acts upon the lungs with a force equal to that with which the thorax resists, so that the lungs will remain in a state of rest. Hence less blood will pass through them, and a smaller quantity of it will be forced into the left ventricle of the heart, and consequently less blood will be conveyed to the cerebellum and its nerves. The arterial blood will also act less upon the intercostal muscles and diaphragm, so that the causes dilating the thorax are weakened. Hence the elasticity of the cartilaginous segments again depresses the ribs, in which work they are also assisted by the muscular fibres arising from the side of the sternum within the thorax, and inserted into the bony extremities, and cartilages of the true ribs. At the same time the distracted fibres of the peritonæum and abdominal muscles restore themselves. Hence the compressed viscera thrust the relaxed diaphragm upwards into the thorax, which is by this means contracted, and the air expelled from the lungs,

lungs. By this means, expiration and the action already mentioned, are performed. But in a particular manner by these two actions the blood is not only carried through the lungs, but its motion accelerated. See CIRCULATION, &c.

Physicians are not agreed about the use and effects of respiration; some think that the air is insinuated into the vessels of the lungs, to give a greater fluidity and motion to the blood; others, that it conveys very subtle nitrous corpuscles thereunto, which gives it the red colour; others again believe the air serves to condense the blood, which has been heated by circulation. This is certain, that the air entering into the lungs, and all the small ramifications which surround its vesicles is broke, comminuted, and rendered more fluid, and that it is deprived of a serosity, which proceeds from the lungs by perspiration in the form of a vapour that is visible in cold weather. It may be added, that the voice, laughter, coughing, sneezing, yawning, and sucking, depend upon respiration. Boerhaave takes the principal uses of respiration to be the further preparation of the chyle, its more accurate mixture with the blood, and its conversion into a nutritious juice, proper to repair the decays of the body. Other authors take a great use of respiration to be, by the neighbourhood of the cold nitrous air, to cool the blood coming reeking hot out of the right ventricle of the heart through the lungs, and to act as a refrigeratory; others assert one grand use of respiration to be the throwing off the fuliginous vapours of the blood, along with the expelled air; and for inspiration they assert, that it conveys a nitro-aerial ferment to the blood, to which the animal spirits, and all muscular motion, are owing. But Dr. Thurston rejects all these, as being the principal uses of respiration, and from the experiments of Dr. Croon, Dr. Hook, and others, made before the Royal Society, he shews the principal use of respiration to be that of moving, or passing the blood from the right to the left ventricle of the heart, and so to effect circulation; whence it is, that persons hanged, drowned, or strangled, so suddenly die, *viz.* because the circulation of the blood is stopped, and for the same reason it is, that animals die so speedily in the air-pump. This use of respiration Dr. Drake not only confirms,

but carries farther, making it the true cause of the diastole of the heart, which neither Borelli, Dr. Lower, nor Mr. Cowper, had well accounted for. See the articles DIASTOLE and SYSTOLE.

From experiments made upon dogs, and other animals, Dr. Hales shews, that without respiration, the blood would soon turn putrid and pestilential; and indeed the only animal exempted from the necessity of respiration is a foetus. See the article FOETUS.

With regard to the force of respiration, the last mentioned author observes, that though a man by a peculiar action of his mouth and tongue, may suck mercury twenty-two inches, and some men twenty seven or twenty-eight, high, yet he found from experience, that by the bare inspiring action of the diaphragm and dilating thorax, he himself could scarcely raise the mercury two inches, at which time the diaphragm must act with a force equal to the weight of a cylinder of mercury, whose base is commensurate to the area of the diaphragm, and its height two inches, whereby the diaphragm must at the same time sustain a weight equal to many pounds; neither are its counteracting muscles, those of the abdomen, able to exert a greater force.

With regard to the quantity of moisture carried off by respiration, the Doctor, from an experiment on wood-ashes, estimates that quantity to be equal to seventeen grains in fifty expirations, whence there will proportionably be four hundred and eight grains evaporated or breathed off in twelve hundred expirations, being the number in an hour, and thence in twenty four hours 9792 grains, or 1.39 pounds, which supposing the surface of the lungs to be 41635 square inches, then the quantity evaporated from that inward surface will be $\frac{1}{1674}$ th part of an inch depth.

From the violent and fatal effects of very noxious vapours on the respiration and life of animals, the Doctor shews how the respiration is proportionably incommoded when the air is loaded with lesser degrees of vapours, which vapours do in some measure clog and lower the air's elasticity, which it best regains by having these vapours dispelled by the ventilating motion of the free open air, that is best rendered wholesome by the agitation of winds; thus what we call a close warm air, such as has been long confined in a room, without having the vapours

in it carried off by communicating with the open air, is apt to give us more or less uneasiness in proportion to the quantity of vapours which are floating in it. And thus many of those who have weak lungs, but can breathe very well in the fresh country air, are greatly incommoded in their breathing, when they come into large cities where the air is full of fuligineous vapours; and even the most robust and healthy, in changing from a city to a country air, find an exhilarating pleasure arising from a more free and kindly inspiration, whereby the lungs being less loaded with condensing air and vapours, and thereby the vesicles more dilated with a clearer and more elastic air, a freer course is thereby given to the blood, and probably a purer air mixed with it. See the article **AIR**.

RESPITE, in law, &c. signifies a delay, forbearance, or prolongation of time, granted any one, for the payment of a debt, or the like.

RESPONDENT SUPERIOR, in law, is a superior's answering for the insufficiency of an inferior. Thus, if the sheriffs of London are insufficient, the lord-mayor and commonalty must answer for them, as the sheriffs superior.

Superior officers must also answer for their deputies, in civil actions, in case they are insufficient to answer damages; as where a gaoler deposes another under him, and the person deputed suffers an escape, the gaoler must answer for his deputy's insufficiency.

RESPONDENT, in the schools, one who maintains a thesis, in any art or science; who is thus called, from his being to answer all the objections proposed by the opponent.

The respondent is to see whether the position made by the contrary party be just and legitimate; or whether some of the laws of opposition be not broken. He is also to manage the modes and figures of the syllogisms, to see whether the premises be just; and through the whole, to answer rather by distinguos, than by direct negation.

RESPONDENT, in law, a person who undertakes to answer for another; and also, one who binds himself as a security for another person's good behaviour.

RESPONSALIS, in law, is a person who answers for another, in court, at a day assigned.

RESPONSARY SONG, an anthem, in which the choristers sing by turns.

RESPONSE, an answer or reply. A word chiefly used in speaking of the answers made by the people to the priest, in the litany, the psalms, &c.

RESSAULT, in architecture, is the effect of a body which either projects or sinks back; that is, stands more out or in, than another, so as to be out of the line or level with it.

RESSORT, or **RESORT**, a french word, sometimes used by english authors, to signify the jurisdiction of a court, and particularly one from which there is no appeal.

Thus it is said, that the house of lords judge en dernier ressort, or in the last resort.

RESSOURCE, a french word, used by english writers, to denote an after-game, for recovering a person's losses, or something to apply back to, for succour.

REST, *quies*, the continuance of a body in the same place, or its continual application or contiguity to the same parts of the ambient or contiguous bodies; and, therefore, is opposed to motion. See the article **MOTION**.

Sir Isaac Newton defines true or absolute rest, to be the continuance of a body in the same part of absolute space; and relative rest to be the continuance of a body in the same part of relative space. See the article **SPACE**.

It is one of the laws of nature, that matter is indifferent to motion or rest, as has been shewn under the article **INERTIA**.

Rest, considered in a physical view, is only salutary, in so far as it is duly proportioned to the exercise; for a sedentary idle life brings on many indispositions. See the article **EXERCISE**.

REST, in poetry, is a short pause of the voice, in reading, being the same with the cæsura, which, in alexandrian verses, falls on the sixth syllable; but in verses of ten or eleven syllables, on the fourth. See the articles **CÆSURA**, **ALEXANDRIAN**, &c.

REST, in music, the same with pause. See the article **PAUSE**.

RESTAURATION, the act of re-establishing or settling a thing in its former good state.

RESTAURATION, in architecture, the act of repairing those parts of a building that are gone to decay, in such a manner as to give it its original strength and beauty.

From the plinths of the corinthian columns of the Pantheon, which are almost wholly

wholly under ground, it is evident that the pavement of this temple is only a reftauration made in the time of Septimus Severus.

RESTAURATION, in fculpture, is the repairing a mutilated ftatue, &c.

Many of the antique ftatues have undergone a reftauration; as the wrefllers, in the gallery of the great duke of Florence; the farnefe Hercules; the Faunus in the villa Borghefe, at Rome; and the Venus of Arles, in the gallery at Verfailles: but thefe reftaurations have all been made by the ableft fculptors.

RESTINCTION, in chemistry, is the quenching a metal or mineral, in fome liquor, in order either to correct or exalt it, by giving it fome new power or quality.

RESTITUTION, in physics, is reftoring an elastic body, forcibly bent, to its natural ftate. See the article **ELASTICITY**.

RESTITUTION, in a moral and legal fenfe, is reftoring a perfon to his right; or returning fomething unjuftly taken or detained from him.

In the romifh church, ufurers, &c. are obliged to a reftitution of their ill-gotten goods; otherwife the prieft has no authority to give them abfolution.

RESTITUTION IN INTEGRUM, the fame with reftiffion. See **RESCISSION**.

RESTITUTION of medals, or RESTITUTED MEDALS, is a term ufed by antiquaries, for fuch medals as were ftuck by the emperors, to retrieve the memory of their predeceffors.

Hence, in feveral medals we find the letters **REST**. This practice was firft begun by Claudius, by his ftriking afrefh feveral medals of Auguftus. Nero did the fame; and Titus, after his father's example, ftuck reftitutions of moft of his predeceffors. Gallienus ftuck a general reftitution of all the preceding emperors, on two medals, the one bearing an altar, the other an eagle, without the **REST**. See the article **MEDAL**.

RESTITUTIONE TEMPORALIU, is a writ that lies when a man is elected and confirmed bifhop of a diocefe, for the recovery of the temporalities of the bifhopric.

This writ is directed from the king to the efcheator, or rather fheriff of the county.

RESTIVE, or **RESTY**, in the manege, a ftubborn, unruly, ill-broken horfe, that ftops, or runs back, inftead of advancing forward.

RESTORATION, the fame with reftauration. See **RESTAURATION**.

In England, the return of king Charles II. in 1660, is, by way of eminent, called the Reftoration; and the 29th of May is kept as an aniverfary feftival, in commemoration of that event, by which the regal and epifcopal government was reftored.

RESTORATIVE, in medicine, a remedy proper for reftoring and retrieving the ftrength and vigour both of the body and animal fpirits.

All under this clafs, fays Quincy, are rather nutrimental than medicinal; and are more adminiftered to repair the wafte of the conftitution, than to alter and rectify its diforders. Whatfoever can answer this end, muft be both endued with a difpofition to enter into, and mix with, the moft fubtile of the animal fluids, and to fall into and adhere with fuch interftices of the folids, as have been wore away by action, and ftand in need of recruit. Thefe are one of the claffes of balfamics, and are diftinguifhed by the term analeptics. See the articles **ANALEPTICS**, **BALSAMICS**, &c.

Some of the principal medicines of this intention are the leaves of white and black maide-hair, eruca, colts-foot, piftachionuts, fcabious, balfam of Tolu, bdellium, benzoin, eryngo, ftorax, barley, &c. Hoffman obferves, that a true and genuine reftoration of the natural ftrength depends upon proper aliments, both of the eatable and drinkable kind, being converted into good blood, and laudable juices, which afterwards generate that fubtil fluid which is fecreted in the brain; and being carried through the nerves to the mufcles and mufcular coats, principally fupplies the body, and its feveral parts, with ftrength and vigour. Thofe nutritives, therefore, which afford a matter moft proper for this purpofe, are the beft analeptics; of which kind are glutinous broths of flefh, capons, and bones with their marrow, boiled in a clofe veffel, with water, a little wine, fome flices of lemon, a little falt, powder of mace and cloves; broths alfo made of coarfe weftphalian bread, water, wine, and eggs; chocolate, with or without milk, afles milk, &c. But thofe nutritive and ftrengthening aliments, he adds, are not to be ufed in the very time of the difeafe, nor when the whole mafs of blood and humours are impure; but when the diftemper is over, and where, by a preced-

ing disease, or by long watching, fatigue, and labour of body, or large hæmorrhages, the strength is wasted and impaired: but even then a proper moderation is to be observed and kept up to, because these aliments pass very speedily into the blood, and augment its quantity.

RESTRICTION, among logicians, is limiting a term, so as to make it signify less than it usually does.

RESTRINGENT, in medicine, the same with astringent. See **ASTRINGENTS**.

RESULT, what is gathered from a conference, inquiry, meditation, or the like; or the conclusion and effect thereof.

RESUMMONS, in law, is the second summons or calling of a person to answer an action, where the first summons is defeated by any accident, as the death of a party, or the like.

RESUMPTION, a word used in various senses: thus, in law, it signifies the king's taking again into his own hands, such lands, &c. as he had before, on false suggestions, granted to a person by letters patent.

In the schools, resumption signifies a summary repetition of an argument, in order to confute it.

The same word is also used by logicians for the reduction either of some figurative or quaint proposition, to one more plain or intelligible; as, the meadows smile; that is, look pleasant.

RESURRECTION, in theology, rising again from the dead; or a person's returning to a second life, with new bodily organs, adapted to the state of its new existence.

One of the greatest arguments for the truth of christianity is drawn from the resurrection of our Saviour; the circumstances of which are handed down to us in so plain and distinct a manner, by the evangelists, as make the evidence of this important truth amount to a demonstration.

Christians generally believe, that at the day of judgment, the very identical body they have now, with the same flesh, blood, and bones, will be raised from the dead. But, in opposition to this opinion, many texts of scripture have been urged, particularly the account given of this important event by St. Paul; besides several philosophical objections, the principal of which are these.

That the same substance may happen to be a part of two or more bodies: thus a

fish feeding on a man, and another man afterwards feeding on the fish, part of the body of the first man becomes incorporated with the fish, and afterwards with the body of the last man. Again, instances have been known of one man's immediately feeding on the body of another; and among the cannibals in the West-Indies, who devour their enemies, the practice is frequent. Now it is alleged, where the substance of one is thus converted into the substance of another, each cannot arise with his whole body; to which then shall the common part be allotted?

To this objection some answer, that as all matter is not capable of being assimilated to the body, and incorporated with it, human flesh may very probably be of this kind; and, therefore, what is thus eaten, may be again excreted and carried off.

But Mr. Leibnitz observes, that all that is essential to the body, is the original stamen, which existed in the semen of the father: this may be conceived as the most minute point imaginable, and therefore not to be separated, nor any part of it united to the stamen of any other man. That all this bulk we see in the body, is only an accretion to this original stamen; and therefore there is no reciprocation of the proper matter of the human body.

Another objection is, that we know, by the late discoveries in the animal economy, that the human body is continually changing, and that a man has not entirely the same body to-day, as he had yesterday; and it is even computed that in less than seven years time, the whole body undergoes a change. Which of those many bodies then, which the same person has in the course of his life, is it that shall rise? or does all the matter that has ever belonged to him, rise again? or does only some particular system thereof? the body, for example, he had at twenty, at forty, or at sixty years old? If only this or that body arise, how shall it be rewarded or punished for what was done by the other? and with what justice does one person suffer for another?

To this it has been answered, on the principles of Leibnitz, that notwithstanding these successive changes, this stamen, which is the only essential part of the body, has always remained the same; and that on Mr. Locke's principles, personal identity, or the sameness of a rational being, consists in self-consciousness,

in the power of considering itself the same thing in different times and places. By this, every one is to himself what he calls self; without considering whether that self be continued in the same, or in several substances. It is the same self now, it was then; and it was by the same self which now reflects on an action, that action was performed. Now it is this personal identity that is the object of rewards and punishments, which, it is observed may exist in different successions of matter; so that to render the rewards and punishments just and pertinent, we need only to rise again with such a body as that we retain the consciousness of our past actions.

RESUSCITATION, the same with resurrection and revivification. See the preceding article.

The term resuscitation, however, is more particularly used by chemists, for the reproducing a mixed body from its ashes; an art to which many have pretended, as to reproduce plants, &c. from their ashes.

RETAIL, in commerce, is the selling of goods in small parcels, in opposition to wholesale. See the article **COMMERCE**.

RETAINER, in law, a servant who does not continually dwell in the house of his master, but only attends upon special occasions.

RETAINING FEE, the first fee given to a serjeant or counsellor at law, in order to make him sure, and prevent his pleading on the contrary side. See **FEE**.

RETALIATION, among civilians, the act of returning like for like. See the article **TALIO**.

RETARDATION, in physics, the act of diminishing the velocity of a moving body. See the article **MOTION**.

If bodies of equal bulk, but of different densities, be moved through the same resisting medium, with equal velocity, the medium will act equally on each, so that they will have equal resistances, but their motions will be unequally retarded, in proportion to their densities. See the article **RESISTANCE**.

Retarded motion from gravity, is peculiar to bodies projected upwards, and this in the same manner as a falling body is accelerated; only in the latter, the force of gravity acts in the same direction with the motion of the body; and in the former in an opposite direction. See the article **ACCELERATION**.

As it is the same force which augments the motion in the falling, and diminishes

it in the rising body, a body will rise till it has lost all its motion; which it does in the same time wherein a body falling would have acquired a velocity equal to that wherewith the body was projected upwards.

RETE MIRABILE, in anatomy, a small plexus, or net-work of vessels in the brain, surrounding the pituitary gland. The rete mirabile is very conspicuous in brutes, but either not existent in man, or so very minute that its existence is fairly doubted. See the article **BRAIN**.

RETENTION, is defined, by Mr. Locke, to be a faculty of the mind, whereby it keeps, or retains, those simple ideas it has once received, by sensation or reflection.

This is done two ways; first, by keeping the idea which is brought into the mind for some time in view; this is called contemplation. See the article **CONTEMPLATION**.

Secondly, by reviving those ideas in our minds which have disappeared, and have been as it were laid out of sight; this is memory, which is as it were the repository of our ideas. See **MEMORY**.

RETENTION is also used, in medicine, &c. for the state of contraction in the solids or vascular parts of the body, which makes them hold fast their proper contents. In this sense retention is opposed to evacuation and excretion. See the articles **EVACUATION** and **EXCRETION**. Retention and excretion make two of the non-naturals.

Retention is also frequently considered as a disorder, and defined to be the act of retaining the excrements, humours, &c. so as they cannot be voided out of the body. See the article **COSTIVENESS**.

For the retention of the urine, see the articles **DYSURY**, **ISCHURY**, and **STRANGURY**.

RETIARII, in antiquity, a kind of gladiators, thus denominated from a net which they made use of against their antagonists, who were called *secutores*, and sometimes *mirmillones*. See the article **GLADIATOR**.

This net they carried under their buckler, and when opportunity served, cast it over the head of their antagonist, and in this condition killed him with a trident which they bore in the other hand.

RETICENCY, *reticentia*, a figure in rhetoric whereby we make oblique mention of a thing, in pretending to pass it over unmentioned.

RETFORD, a borough-town of Nottinghamshire, situated twenty-five miles north of Nottingham.

It sends two members to parliament.

RETICULA, or **RETICULE**, in astronomy a contrivance for the exact measuring the quantity of eclipses.

The reticule is a little frame, consisting of thirteen fine silken threads, equidistant from each other, and parallel, placed in the focus of object-glasses of telescopes; that is, in the place where the image of the luminary is painted in its full extent: of consequence, therefore, the diameter of the sun or moon is hereby seen divided into twelve equal parts or digits; so that to find the quantity of the eclipse, there is nothing to do but to number the luminous and the dark parts. As a square reticule is only proper for the diameter, not for the circumference, of the luminary, it is sometimes made circular by drawing six-concentric equidistant circles. This represents the phases of the eclipse perfectly.

RETICULAR BODY, *corpus reticulare*, in anatomy, a very fine membrane, perforated, in the manner of a net, with a multitude of foramina. It is placed immediately under the cuticle, and when that is separated from the cutis, whether by art or by accident, this adheres firmly to it, and is scarce possible to be parted from it, seeming rather to be its inner superficies than a distinct substance. In regard to this, we are to observe, first, the places in which it is found, being all those in which the sense of feeling is most acute, as in the palms of the hands, the extremities of the fingers, and on the soles of the feet. The tongue, however, is the part where it is most accurately to be observed: it is more easily distinguishable there than any where else, and its nature and structure are most evidently seen there.

Its colour in the Europeans is white, but in the Negroes, and other black nations, it is black; in the tawny it is yellowish: the skin itself in both is white; and the blackness and yellowness depend altogether on the colour of this membrane.

The uses of the *corpus reticulare* are to preserve the structure of the other parts of the integuments, and keep them in their determinate form and situation. Its apertures give passage to the hairs, and let through the papillæ and excretory ducts of the skin: it retains these in a certain and determinate order, that they

cannot be removed out of their places and has some share in preserving the softness of the papillæ, which renders them fit for the sense of feeling. See the articles **CUTICLE** and **CUTIS**.

RETICULAR PLEXUS, *plexus reticularis* sometimes denotes the choroides, which is thus called because its fibres are interwoven like a net. See **CHOROIDES**.

RETICULUM, the caul or omentum, a name sometimes given to this part, from its net-like structure. See **OMENTUM**.

RETIFORMIS LACIS, in anatomy, the same with the rete mirabile. See the article **RETE MIRABILE**.

RETINA, in anatomy, the expansion of the optic nerve on the internal surface of the eye, whereupon the images of objects being painted, are impressed, and by that means conveyed to the common sensory in the brain, where the mind views and contemplates their ideas. See the article **EYE**.

Diseases of the RETINA. The retina is liable to two sorts of diseases; the first is a separation of some parts of this membrane from the choroides. At the place where this separation is made, there follows an elevation or fold which stops the light, and hinders its passage to that part of the choroides which is covered by this fold: this occasions a sort of shadow which the patients see in the air. The second disease of the retina is an atrophy or wasting of that membrane.

The cause of the first disease may be accounted for, from the blood-vessels of the retina's turning varicose; for it is easily conceived that the dilatation of these vessels may separate the retina from the choroides, in that part which answers to the dilated vessels. This disease is observed to proceed from a cold in the head after some violent exercise, or whatever else may have put the blood in a violent motion. Its signs are certain appearances in the air, more or less distant from the patient's eye, being a kind of shadows of different figures, modified according to the size and form of the part of the retina, which are separated.

A further account of this disease, and the manner of treating it, may be seen in *Atoms and flies appearing before the EYES*, under the article **EYE**.

In an atrophy of the retina, as the rays of light are not sufficiently modified by that membrane, they make too vivid an impression on the choroides, which is very detrimental to it. Hence ensues confusion



RETRAHENS *auriculam*, in anatomy, a muscle of the external ear, consisting of a parcel of fleshy fibres, which in some bodies are divided into three distinct muscles arising from the os temporale, and fixed to the hind part of the concha. But these muscles are so small in men, that the auricle is seldom moveable at all. See the article **EAR**.

RETRAXIT, in law, is where a plaintiff comes in person to the court where his action is brought, and declares he will not proceed in it, in which case the action is barred for ever.

A *retraxit* differs from a nonsuit in this, that it is always where the plaintiff or demandant is personally in court. See the article **NON-SUIT**.

RETREAT, in war, the retiring or moving back again of any army or part thereof.

RETREAT, or **RELAY**, in masonry, a little recess or diminution of the thickness of a wall, rampart, &c. in proportion as it is raised. The retreat, properly, is the diminution of a wall without side, or the contraction of its upper courses more than the foundation. Where the foundation is very long, they usually make two or three retreats.

RETRENCHMENT literally signifies something cut off or taken from a thing; in which sense it is the same with subtraction, diminution, &c.

RETRENCHMENT, in the art of war, any kind of work raised to cover a post, and fortify it against the enemy, such as fascines loaded with earth, gabions, barrels of earth, sand-bags, and generally all things that can cover the men and stop the enemy. But retrenchment is more particularly applicable to a foss bordered with a parapet; and a post fortified thus is called post retrenched, or strong post. Retrenchments are either general or particular: general retrenchments are new fortifications made in a place besieged, to cover the besiegers when the enemy become masters of a lodgment on the fortification, that they may be in a condition of disputing the ground inch by inch, and of putting a stop to the enemy's progress in expectation of relief. See the article **RETIRADE**.

Particular retrenchments are such as are made in the bastions when the enemy are masters of the breach. These can never be made but in new full bastions, for in empty, or hollow ones, there can only be made *retirades*. The particular re-

trenchments are made several ways, according to the time they have to cover themselves: sometimes they are made before-hand, which are certainly the best. The parapets of such retrenchments ought to be five or six feet thick, and five feet high, with a large and deep foss, from whence ought to run out small *fougades* and countermines. See **FOUGADE**.

RETRIBUTION, *retributio*, a handsome present, gratuity, or acknowledgment, given instead of a formal salary, or hire, to persons employed in affairs that do not so immediately fall under estimation, nor within the ordinary commerce in money.

RETRIEVE, to recover, get again, or repair a thing lost or damaged.

To retrieve, in falconry, signifies to spring or find partridges again which have been once sprung before.

RETROACTIVE, in law, that which has an influence or effect on time past.

RETROCESSION, *retrocesso*, the act of going backwards; more usually called retrogression, or retrogradation. See the next article.

RETROCESSION of the equinox. See the article **PRECESSION**.

RETROGRADATION, or **RETROGRESSION**, the act or effect of a thing moving backwards.

The retrograde motion of the planets is an apparent motion, whereby they seem, to an observer placed on the earth, to move backwards, or contrary to the signs. See the articles **PLANET**, **ORBIT**, &c.

As to the retrograde motion of the sun, when in the torrid zone, and has his declination **AM** (plate **CCXXXII**. fig. 3.) greater than the latitude of the place **AZ**, but either northern or southern as that is, the sun will appear to go backwards, or to be retrograde both before and after noon.

For draw the vertical circle, **ZGN**, to be a tangent to the sun's diurnal circle in **G**, and another, **ZON**, through the sun rising in **O**. It is evident all the intermediate vertical circles cut the sun's diurnal circle twice; first, in the arch **GO**, and the second time in the arch **GI**. Wherefore, as the sun ascends through the arch **GO**, it continually arrives at farther and farther verticals. But, as it continues its ascent through the arch **GI**, it returns to its former verticals; and, therefore, is seen retrograde for some time before noon. The same, as may be shewn after the same manner,

ner, it does for some time after noon.

The retrograde motion of the nodes, is a motion of the line of nodes, whereby it continually shifts its situation from east to west, contrary to the order of the signs; completing its retrograde circulation in the compass of about nineteen years, after which time either of the nodes, having receded from any point of the ecliptic, returns to the same again.

RETROGRESSION of *curves*, their bending or turning backwards. See the articles **FLEXURE** and **INFLECTION**.

RETROMINGENTS, in natural history, a class or division of animals, whose characteristic it is that they stale, or make water, backwards, both male and female.

RETURN, *returna*, or *retorna*, in law, is used in divers senses. 1. Return of writs by sheriffs and bailiffs is a certificate made by them to the court, of what they have done in relation to the execution of the writ directed to them. This is wrote on the back of the writ by the officer, who thus sends the writ back to the court from whence it issued, in order that it may be filed. 2. Return of a commission, is a certificate or answer sent to the court from whence the commission issues, concerning what has been done by the commissioners. 3. Returns, or days in bank, are certain days in each term, appointed for the return of writs, &c. Thus Hilary term has four returns, *viz.* in the king's bench, on the day next after the octave, or eighth day after Hilary day: on the day next after the fifteenth day from St. Hilary: on the day after the purification, and on the next after the octave of the purification. In the common pleas, in eight days of St. Hilary: from the day of St. Hilary, in fifteen days: on the day after the purification: in eight days of the purification. Easter term has five returns, *viz.* in the king's bench, on the day next after the fifteenth day from Easter: on the day next after three weeks from Easter: on the day next after one month from Easter: on the day next after five weeks from Easter: and on the day next after the day following ascension-day. In the common pleas, in fifteen days from the feast of Easter: in three weeks from the feast of Easter: in one month from Easter day: in five weeks from Easter day: on the day after the ascension-day. Trinity term has four returns, *viz.* on the day following the second day after Trinity:

on the day following the eighth day after Trinity: on the day next after the fifteenth day from Trinity: on the day next after three weeks from Trinity. In the common pleas, on the day after Trinity: in eight days of Trinity: in fifteen days from Trinity: in three weeks from Trinity. Michaelmas term has six returns, *viz.* on the day next after three weeks from St. Michael: on the day next after one month of St. Michael: on the day following the second day after All-souls: on the day next after the second day after St. Martin: on the day following the octave of St. Martin: on the day next after fifteen days of St. Martin. In the common pleas, in three weeks from St. Michael: in one month from St. Michael: on the day after All-souls: on the day after St. Martin: on the octave of St. Martin: in fifteen days from St. Martin. It is to be observed, that, as in the king's bench, all returns are to be made on some particular day of the week in each term, care must be taken not to make the writs out of that court returnable on a non-judicial day; such as Sunday, and All-saints, in Michaelmas term, the purification in Hilary, the ascension in Easter, and Midsummer-day, except it should fall on the first day of Trinity term. See the article **TERM**.

RETURN, in building, is a side or part that falls away from the foreside of any strait work.

RETURNS of a trench, in fortification, are the turnings and windings which form the lines of a trench.

RETURNS of a mine, in fortification, are the windings of the gallery. See the articles **GALLERY** and **MINE**.

RETURNO HABENDO, or **RETURNUM AVERIORUM**, is a writ which lies for a person who has avowed a distress by him made, and proved the same to be lawfully taken, for returning to him the cattle distrained which were before replevied by the party distrained.

The same writ is also granted when the action is removed by recordari or accedas ad curiam, into the court of common pleas; and he whose cattle were distrained, makes default and does not prosecute his action.

RETURNUM IRREFLEGIABILE, a writ for the final return of cattle to the owner, when found to be unjustly distrained.

REVE, **REEVE**, or **GREVE**, the bailiff of a franchise, or manor, thus called, especially

ally in the west of England. Hence shire-reve, sheriff, port-greve, &c. See the article GREVE.

REVEILLE, a beat of drum about break of day, to give notice that it is time for the soldiers to arise, and that the countries are to forbear challenging.

REVEL, a port-town of Livonia, situated at the south entrance of the gulph of Finland: east long. 24°, north lat. 59°.

REVELATION, the act of revealing, or making a thing public that was before unknown: it is also used for the discoveries made by God to his prophets, and by them to the world; and more particularly for the books of the Old and New Testament. See the articles BIBLE, INSPIRATION, FAITH, PROPHECY, &c. The principal tests of the truth of any revelation are, its being worthy of God, and consistent with his known attributes, its being agreeable to the clear dictates of unprejudiced reason, and its having a tendency to refine, purify, and exalt the mind of man to an imitation of the Deity in his moral perfections.

Mr. Locke, in laying down the distinct provinces of reason and faith, observes, 1. That the same truths may be discovered by revelation, which are discoverable to us by reason. 2. That no revelation can be admitted against the clear evidence of reason. 3. That there are many things of which we have but imperfect notions, or none at all; and others, of whose past, present, or future existence, by the natural use of our faculties we cannot have the least knowledge: and these, being beyond the discovery of our faculties, and above reason, when revealed become the proper objects of our faith. He then adds, that our reason is not injured or disturbed, but assisted and improved by new discoveries of truth coming from the fountain of knowledge. Whatever God has revealed is certainly true; but whether it be a divine revelation or no, reason must judge, which can never permit the mind to reject a greater evidence to embrace what is less evident. There can be no evidence that any traditional revelation is of divine original, in the words we receive it, and the sense we understand it, so clear and so certain, as that of the principles of reason; and, therefore, nothing that is contrary to the clear and self-evident dictates of reason, has a right to be urged or assented to as a matter of faith, wherein reason has nothing to do. Whatsoever is divine re-

velation ought to over-rule all our opinions, prejudices, and interests, and has a right to be received with full assent: and such a submission as this, of our reason to faith, takes not away the landmarks of knowledge.

REVELATION of *St. John*, the same with the apocalypse. See APOCALYPSE.

REVELS, entertainments of dancing, masking, acting comedies, farces, &c. antiently very frequent in the inns of court, and in noblemens houses, but now much disused. The officer who has the direction of the revels at court, is called the master of the revels.

REVENUE, the annual income a person receives from the rent of his lands, houses, interest of money in the stocks, &c.

REVENUE, in hunting, a fleshy lump formed chiefly of a cluster of whitish worms on the heads of deer, supposed to occasion their casting their horns by gnawing them at the roots.

REVENUE is also used for a new tail of a partridge, growing after the lop of a former; this is measured by fingers; and thus they say a partridge of two, three, or four fingers revenue.

REVERBERATION, *reverberatio*, in physics, the act of a body repelling or reflecting another after its impinging thereon. See the article REPULSION.

REVERBERATION, in chemistry, denotes a kind of circulation of the flame by means of a reverberatory, or the return of the flame from the top of the furnace back to the bottom, chiefly used in calcination. Reverberation is of two kinds: the first with a close fire, that is, a reverberatory furnace, where the flame has no vent at top, being covered with a dome or capital, which repels its action back on the matter of the vessel that contains it, with increased vehemence. After this manner is refining, the distillation of acids, spirits, &c. performed. Reverberation with an open fire is that performed in a furnace or reverberatory, whose registers are all open, used in calcination, &c. See the next article.

REVERBERATORY, or REVERBERATING FURNACE, a chemical furnace built close all around, and covered at the top with a capital of brick or tiles, so as not to give any vent to the heat or flame, but to determine it to reverberate or turn back from the brick-work with new force upon the matter placed at bottom. When the fire has no vent or passage at top, it is a whole reverberatory. When the

the middle of the capital is open, and only the sides close, so that there is only a half circulation of the flame, it is called an half reverberatory. The reverberatory furnace is chiefly used in the fusion and calcination of metals and minerals, and on other occasions where the most intense heat is required, as in assaying, &c. Whence it is also called the melting furnace, and assaying furnace. See the articles FURNACE, *Assaying OVEN*, LABORATORY, &c.

REVEREND, *reverendus*, a title of respect given to ecclesiastics.

The religious abroad are called reverend fathers; and abbesses, prioresses, &c. reverend mothers. With us, bishops are right reverend, and archbishops, most reverend. In France, their bishops, archbishops, and abbots, are all alike most reverend.

REVERIE, the same with delirium, raving, or distraction. See DELIRIUM, &c. It is used also for any ridiculous, extravagant imagination, action, or proposition, a chimera or vision. But the most ordinary use of the word, among english writers, is for a deep disorderly musing or meditation.

REVERO, a town of Italy, in the dutchy of Mantua, situated on the south of the Po, opposite to Ostiglia, fifteen miles south-east of Mantua,

REVERSE, in law, &c. To reverse signifies to undo, repeal, or make void.

REVERSE of a medal, coin, &c. denotes the second or back-side, in opposition to the head or principal figure.

REVERSE, in fencing, a back stroke. See the article FENCING.

REVERSED, in heraldry, a thing turned backwards, or upside down.

REVERSION, *reversio*, in law, is defined to be returning of lands, &c. into the possession of the donor, or his heirs.

Reversion, in the law of England, has two significations; the one of which is an estate left, which continues during a particular estate in being; and the other is the returning of the land, &c. after the particular estate is ended; and it is further said, to be an interest in lands, when the possession of it fails; or where the state which was for a time parted with, returns to the grantors, or their heirs. But, according to the usual definition of a reversion, it is the residue of an estate left in the grantor, after a particular estate granted away ceases, continuing in the grantor of such an estate. The difference between a remainder and

a reversion, consists in this, that the remainder may belong to any man except the grantor; whereas the reversion returns to him who conveyed the lands, &c. See the article REMAINDER.

In order to render the doctrine of reversions easy, we shall give the following table; which shew the present value of one pound, to be received at the end of any number of years not exceeding forty; discounting at the rate of 5, 4, and 3 per cent. compound interest. See the article INTEREST.

Years.	Value at 5 per Cent.	Value at 4 per Cent.	Value at 3 per Cent.
1	.9524	.9615	.9709
2	.9070	.9245	.9426
3	.8638	.8898	.9151
4	.8227	.8548	.8885
5	.7835	.8219	.8626
6	.7462	.7903	.8375
7	.7107	.7599	.8131
8	.6768	.7307	.7894
9	.6446	.7026	.7664
10	.6139	.6756	.7441
11	.5847	.6496	.7224
12	.5568	.6246	.7014
13	.5303	.6006	.6809
14	.5051	.5775	.6611
15	.4810	.5553	.6419
16	.4581	.5339	.6232
17	.4363	.5134	.6050
18	.4155	.4936	.5874
19	.3957	.4746	.5703
20	.3769	.4564	.5537
21	.3589	.4388	.5375
22	.3418	.4219	.5219
23	.3255	.4057	.5067
24	.3100	.3901	.4919
25	.2953	.3757	.4776
26	.2812	.3607	.4637
27	.2678	.3468	.4502
28	.2551	.3335	.4371
29	.2429	.3206	.4243
30	.2314	.3083	.4120
31	.2204	.2965	.4000
32	.2099	.2851	.3883
33	.1999	.2741	.3770
34	.1903	.2636	.3660
35	.1813	.2534	.3554
36	.1720	.2437	.3450
37	.1644	.2343	.3350
38	.1566	.2253	.3252
39	.1491	.2166	.3158
40	.1420	.2083	.3066

The use of the preceding table.—To find the present value of any sum to be received at the end of a given term of years, discounting at the rate of 3, 4, or 5 per cent. compound interest. Find by the above table the present value of 1 l. to be received at the end of the given term, which multiply by the number of pounds proposed (cutting off four figures from the product on account of the decimals) then the result will be the value sought: For example, the present value of 10,000 l. to be received ten years hence, and the rate of interest 5 per cent. is equal to $.6139 \times 10000 = 6139.0000$ l. or 6139 l. Again, the present value of 10,000 l. due in ten years, the rate of interest being 3 per cent. is $.7441 \times 10,000 = 7441$.

REVERSION of series, in algebra, a kind of reversed operation of an infinite series. See the article **SERIES**.

REVIEW, in chancery, is used for a bill, where a cause has been heard, and a decree thereon signed; but some error in law appearing upon the decree, or new matter being discovered after it was made, this bill is given for a fresh examination into the merits of the cause.

A bill of review must be exhibited by leave of the court, and is generally obtained upon oath made of the discovery of such new matter. The sum of 20 l. must likewise be paid into court on the bringing of this bill, by way of security for costs and delay, in case the matter should be found against the party.

If one part of a decree in chancery be repugnant to another, the decree may be reversed by a bill of review.

REVIEW, in war, is the appearance of an army, or part of an army, in order of battle, and their being viewed by the general, that he may know the condition of the troops, see that they are complete, and be a witness of the expertness with which they perform their evolutions and other exercises.

REVISE, among printers, a second or third proof of a sheet to be printed, taken off in order to be compared with the last proof, to see whether all the mistakes marked in it are corrected. See the article **PRINTING**.

REVIVIFICATION, in chemistry, the same with resuscitation. See the article **RESUSCITATION**.

Bill of REVIVOR, in chancery, is a bill for reviving a cause, where either of the parties dies after the bill and answer, and

before the cause is heard, or if heard, before the decree is inrolled: in which case this bill must be brought, praying that the former proceeding may stand revived, and be put upon the same footing as at the time of the abatement.

REVOCATION, in law, signifies the recalling, or annulling and making void some power, grant, deed, &c. made before.

REVOLUTION, in politics, signifies a grand change or turn in government. In which sense, the revolution is used by way of eminence, for the great turn of affairs in England, in the year 1688, when king James II. abdicating the throne, the prince and princess of Orange were declared king and queen of England, &c. In geometry the revolution of any figure, is its motion quite round a fixed line, as an axis.

The revolution of a planet, or comet, round the sun, is nothing but its course from any point of its orbit till its return to the same. See **ORBIT**, **PERIOD**, **PLANET** and **COMET**.

REVULSION, in medicine, turning a flux of humours from one part to another, by bleeding, cupping, friction, sinapisms, blisters, fomentations, bathings, issues, setons, strong purging of the bowels, &c. Dr. Van Sweiten, in his Commentaries upon the Aphorisms of Boerhaave, observes, that the use of revulsions in diseases, is confirmed by daily experience as well as by reason; for so soon as the resistance to the blood's motion is either diminished or totally removed in any part of the body, it immediately flows into that part with a greater velocity. Thus when all the vessels and viscera of the abdomen are suddenly freed from a considerable pressure by the birth of an infant, all the blood is frequently derived into those vessels so forcibly, that unless the fluid vessels and viscera are compressed by swathing with a roller, the child-bed woman may suddenly perish in a fatal swoon, for want of the blood's due pressure in the vessels of the brain and cerebellum: the same thing also happens if the abdomen is not swathed, when all the water is discharged at once by paracentesis, in the dropsy. If again we consider, that the blood propelled by the heart is sent partly up to the head, and superior parts of the trunk, and partly downward to the viscera and lower extremities, it will be from hence evident, that, by diminishing the resistance of the lower

lower vessels, or by evacuating them, the quantity and impulse of the blood will then be derived more towards the inferior parts, and drawn from those that are superior. It is therefore possible to make a revulsion of the arterial blood from an inflamed part to any other, especially when the part towards which the revulsion is made, receives its blood from the same common trunks or larger arteries. The physicians foment the external parts of the head in inflammatory disorders thereof, that the impulse of the blood, being increased in the branches of the external carotide, may press with a less force upon the parts contained in the head. And Galen has long ago observed, that pains are eased almost as with a charm, by making a revulsion with cupping-glasses.

The different kinds of revulsion are phlebotomy, cupping, friction, vesicatories, issues, setons, warm bathing, fomentations, &c. See PHLEBOTOMY, CUPPING, FRICTION, VESICATORY, &c.

REYGATE, or RYGATE, a borough of Surry, twenty-two miles south-west of London.

It sends two members to parliament.

REZANSKOI, the capital of the province of Rezan, in Russia: east long. 41°, north lat. 55°.

RHABDOIDES, in anatomy, the same with the sagittal suture of the skull. See the articles SKULL and SUTURE.

RHABDOLOGY, in arithmetic, the doctrine of Neper's rods. See NEPER.

RHABDOMANCY, *ῥαβδομαντεία*, a species of divination performed by means of rods. See the article DIVINATION.

RHACHITIS, in medicine, the rickets. See the article RICKETS.

RHAGADES, in medicine, denotes chaps or clefts in any part of the body; arising either from an aridity of the parts, or acrimony of the humours; in both which cases, cooling and emollient applications are proper.

RHAGOIDES, in anatomy, the second coat or tunic of the eye, more usually called uvea. See the article UVEA.

RHALADERGWY, a market-town in Radnorshire, in Wales, situated fifteen miles west of Rador.

RHAMNUS, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of a single, imperforated, infundibuliform petal, rude on the outside, and coloured within: the tube is of a turbinated cylindric figure;

the limb patent, divided and acute at the base of every segment: the petal has little squammula, and is connivent inwardly; the fruit is a roundish naked berry, divided within into fewer cells than there are segments of the corolla; the seeds are single, roundish, gibbous, and compressed on one side.

This genus comprehends the buckthorn, the black alder, Christ's thorn, the alaternus and the jujube-tree. See the articles JUJUBE and ALATERNUS.

Buckthorn-berries bruised on white paper, give it a green tincture; they are in considerable esteem as a cathartic, and are celebrated in dropsies, rheumatisms, and even in the gout; but they generally occasion gripes, sickness, dry the mouth and throat, and leave a thirst of long duration: the dose is about twenty of the fresh berries in substance, and twice or thrice this number in decoction; an ounce of the expressed juice, or a dram of the berries dried. A syrup prepared of the juice is kept in the shops.

RHAPHONTICUM, the name for the root of the rheum. See RHEUM.

RHAPSODI, *ῥαψῳδοί*, *rhapsodists*, in antiquity, persons who made a business of singing pieces of Homer's poems. Cuper informs us, that the rhapsodi were clothed in red when they sung the Iliad, and in blue when they sung the Odyssey. They performed on the theatres, and sometimes strove for prizes in contests of poetry, singing, &c. After the two antagonists had finished their parts, the two pieces or papers they were written in were joined together again: whence the name, *viz.* from *ραπτω*, *suo*, and *ᾠδῆ*, *canticum*: but there seems to have been other rhapsodi of more antiquity than these people, who composed heroic poems or songs in praise of heroes and great men, and sung their own compositions from town to town for a livelihood, of which profession Homer himself is said to be.

RHAPSODOMANCY, an antient kind of divination performed by pitching on a passage of a poet at hazard, and reckoning on it as a prediction of what was to come to pass. There were various ways of practising this rhapsodomancy. Sometimes they wrote several papers or sentences of a poet on so many pieces of wood, paper, or the like, shook them together in an urn, and drew out one which was accounted the lot; sometimes they

they cast dice on a table whereon verses were written, and that whereon the die lodged, contained the prediction. A third manner was by opening a book, and pitching on some verse at first sight. This method they particularly called the *fortes Prænestinæ*; and afterwards, according to the poet made use of, *fortes Homericae*, *fortes Virgilianæ*, &c. See the article *SORTES*.

RHAPSODY, *ῥαψωδία*, in antiquity, a discourse in verse sung or rehearsed by a rhapsodist. Others will have rhapsody to signify a collection of verses, especially those of Homer, which having been a long time dispersed in pieces and fragments, were at length, by Pisistratus's order, digested into books called rhapsodies, from *ῥαπτω*, *suō*, and *ὦδῃ*, *canticum*. Hence, among moderns, rhapsody is also used for an assemblage of passages, thoughts, and authorities raked together from divers authors, to compose some new piece.

RHE, or **REE**, a little island in the bay of Biscay, near the coast of Aunis in France: west long. $1^{\circ} 30'$, north lat. $46^{\circ} 14'$.

RHEEDEA, in botany, a genus of plants the characters whereof are not perfectly ascertained: there is no calyx; the corolla consists of four patent, concave, vertically ovated petals; the filaments are numerous, the germen globose; the fruit is oval, small, succulent, and unilocular; the seeds are three, of an ovato-oblong figure, long and oddly furrowed.

RHEIMS, or **REIMS**, a city of France, capital of the province of Champain, one of the most elegant cities in France, situated seventy-five miles north-east of Paris: east long. 4° , north lat. $49^{\circ} 20'$.

RHETORIANS, a sect of heretics in Egypt, so denominated from Rhetorius their leader. The distinguishing doctrine of this heresiarch, as represented by Philastrius, was, that he approved of all the heresies before him, and taught that they were all in the right.

RHETORIC, *rhetorica*, the art of speaking copiously on any subject, with all the advantage of beauty and force.

Lord Bacon defines rhetoric very philosophically, to be the art of applying and addressing the dictates of reason to the fancy, and of recommending them there so as to affect the will and desires. The end of rhetoric, the same author observes, is to fill the imagination with ideas and

images which may assist nature without oppressing it. Vossius defines rhetoric, the faculty of discovering what every subject affords of use for persuasion. Hence, as every author must invent arguments to make his subject prevail, dispose those arguments, thus found out, in their proper places, and give them the embellishments of language proper to the subject; and if this discourse be intended to be delivered in public, utter them with that decency and force which may strike the hearer; rhetoric becomes divided into four parts, invention, disposition, elocution, and pronunciation. See **INVENTION**, **DISPOSITION**, **ELOCUTION**, and **PRONUNCIATION**.

Rhetoric and oratory differ from each other as the theory from the practice; the rhetorician being he who describes the rules of eloquence, and the orator he who uses them to advantage. Ordinarily, however, the two are used indifferently for each other. See the article **ORATORY**.

For the characters in rhetoric, see the article **CHARACTER**.

RHETORICAL NUMBERS. See the article **NUMBER**.

RHEUM, *ῥευμα*, a thin serous humour, occasionally oozing out of the glands about the mouth and throat. See the article **HUMOUR**.

Rheum is also used for a catarrh. See the article **CATARRH**.

For the rheum in the eyes, see the article **EPIPHORA**.

RHEUM, the **RHAPHONTIC PLANT**, in botany, a genus of the enneandria-trigynia class of plants, the corolla whereof consists of a single petal, which is narrow at the base, and impervious: the limb is divided into six obtuse segments, alternately smaller: there is no pericarpium: the seed is single, large, triquetrous, acute, and surrounded with membranaceous rims.

The root of this plant, which appears evidently to have been the rhubarb of the antients, is by many confounded with the modern rhubarb, though considerably different both in appearance and quality. The raphontic root is of a dusky colour on the surface, of a loose spongy texture, considerably more astringent, but less purgative than the rhubarb; in this last intention two or three drams are required for a dose. It is an ingredient in the venice-treacle, and in some of the colder

colder compositions of the shops, but in these rhubarb is generally used in its place.

Rhaphontic-root, the pound, pays, on importation, 2s. and 7d. and, on exportation, draws back 2s. 3²/₃d.

RHEUMATISM, in medicine, a distemper that happens most commonly in spring or autumn, when there is a remarkable change of air from hot to cold, and from cold to hot, or when the wind suddenly shifts to any opposite point. It begins, according to Sydenham, with a shivering and other symptoms of a fever, and in a day or two's time, or sometimes sooner, a vehement pain seizes one or more of the limbs, raging sometimes in one place and sometimes in another, especially in the arms, wrists, shoulders, and knees: very often there is a redness and swelling, and the fever gradually goes off while the pain remains. This distemper often runs out into a great length, continuing sometimes for some months or years, not perpetually, with the same violence, but coming and going, and from time to time renewing its paroxysms.

It chiefly attacks persons in the flower of their age, after violent exercise, or a great heat of the body from any other cause, and then being too suddenly cooled. Its proximate cause Boerhaave takes to be an inflammation of the lymphatic arteries of the membranes near the ligaments of the joints, but not so violent as to bring on a suppuration. This disease is nearly a-kin to the gout and scurvy, and the blood is like that of those afflicted with the pleurisy. The pain is exasperated upon the least motion: it sometimes attacks the loins and coccix, and sometimes the brain, lungs, and viscera: when it seizes the loins it is then called lumbago: in this case, Sydenham observes that there is a most violent pain in the small of the back, which sometimes extends to the os sacrum, and is like a fit of the gravel, only the patient does not vomit. If this disease is unskilfully treated, it may continue several months or years, but not always with the same violence, but by fits. If it continues and increases, it may cause a stiff joint, which will scarce yield to any remedy.

Sydenham directs to take away ten ounces of blood on the side affected; this must be repeated three or four times, or oftener, once every other or every third

day, according as the strength of the patient will bear. The diet must be very thin, and an emulsion of the four cold seeds may be given; as also a pultice of white-bread and milk, tinged with a little saffron, may be laid to the part affected: a clyster of milk and sugar may be injected on those days the bleeding is omitted. If the patient cannot bear frequent bleeding, after the second or third time give the common purging potion every other day, and an ounce of diacodium at night, till he recovers.

In an incipient rheumatism of the shoulders, Hoffman says that nothing is better than a blister laid between the scapulae; but if it happens to the plethoric, cupping, with sacification in the lower parts, repeated every month, does signal service. The same physician thinks it may be proper to chew rhubarb, from two scruples to a dram, with raisins or currants, two or three times a week.

The spirit of hartshorn and the balsam of guaiacum, given in the quantity of twenty or thirty drops, three or four times a day, Dr. Shaw says, is of great service: but he thinks nothing better than a decoction of the sudorific woods, to the quantity of a quart a day, for a month or six weeks together. This last, when assisted with crude antimony and mercurius dulcis, Hoffman recommends in the venereal rheumatism, which often rises from the remains of a lues venerea contained in the mass of blood. In a scorbutic rheumatism, or that arising from the scurvy, Sydenham directs the patient to take the scorbutic elestuary and water, if he cannot bear any kind of evacuation.

He observes, that young persons who live temperately may be cured by a simple refrigerating diet, and moderate nourishing, with as much certainty as by repeated bleeding: for instance, let the patient live four days upon whey alone; and after that white bread may be allowed for dinner, and on the last day of his illness he may be allowed it for supper. When the symptoms cease he may have boiled chickens, or any thing of easy digestion, but every third day he must live upon whey only, till his strength returns. Boerhaave's method of cure is to the same effect, only he advises warm baths and strong blisters to be laid upon the part affected, nay even cauterizes themselves: but Hoffman observes that great caution should be used with regard to topics, for if the patient's conti-

tution is sanguineous they should all be avoided, and the part covered carefully with the bed-cloaths; but if there is a thick, cold, stagnating humour in the part, and a sense of cold, with a stricture of the pores, then frictions may be used with rough warm cloths, and afterwards cupping with scarifications. If the part becomes stiff and inflexible, with a numbness, which is called a paresis, then take human or canine axungia, two ounces; balsam of Peru, and oil of cloves, each two drams; with which make a liniment for the part: this has been known to have a wonderful effect. Arbuthnot says that cream of tartar in water-gruel, taken for several days, will abate the pains and swellings considerably by its acidity, correcting the alkaline salts of the blood.

Cheyne says, that the hot and inflammatory rheumatisms have all the symptoms of the gout, and, like it, change from place to place, and by over violent evacuations may be translated upon the noble organs.

RHEXIA, in botany, a genus of the octandria-monogynia class of plants, the corolla whereof consists of four roundish patent petals inserted into the calyx; the fruit is a roundish capsule, formed of four valves, containing four cells, and inclosed in the belly of the cup; the seeds are roundish and numerous.

RHEXIS, among oculists, denotes a rupture of the cornea of the eye. See the article **EYE**.

RHIME, in poetry. See **RHYME**.

RHINANTHUS, **YELLOW-RATTLE**, in botany, a genus of the didynamia-angiospermia class of plants, the corolla whereof is a ringent single petal; the tube is almost cylindric, and of the length of the cup; the limb is dehiscent, and compressed at the base; the upper lip is galeated, compressed, emarginated and narrow; the lower one is patulous, plane and semitrifid: the fruit is an orbiculated, erect, compressed, bilocular and bivalved capsule: the seeds are numerous and compressed.

RHINE, a great river rising in the country of the Grisons, in Switzerland, and, running north, continues its course till it forms the lake of Constance; from whence it turns west, and having visited Basil, runs north, dividing Suabia from Alsatia; from thence it runs through the Palatinate, and receiving the Neckar, the Maine and the Moselle, continues its

course north by Mentz, &c. After entering the Netherlands at Skenkinchans, it is divided into several channels, the two largest whereof obtain the names of the Lech and the Waal, which running through the United-provinces discharge themselves into the German Sea, below Rotterdam.

RHINE lower circle consists of the Palatinate of the Rhine and the three ecclesiastical electorates, viz. those of Cologne, Mentz, and Triers.

RHINE upper circle consisted of the Land-graves of Alsatia and Hesse, comprehending the Wetteraw: but only Hesse can be accounted a part of Germany at present, France having united Alsace to that kingdom.

RHINEBURG, a town of Germany, in the circle of the lower Rhine and electorate of Cologne, situated fifteen miles east of Gelder.

RHINEFIELD, the name of two towns of Germany, one whereof is situated in the circle of Suabia, on the Rhine, eight miles east of Basil; the other is the capital of the county of Rhinefield, situated in the circle of the Upper Rhine, sixteen miles north-west of Mentz.

RHINE-LAND-ROD, in fortification, &c. a measure of two fathoms, or twelve feet, used by the Dutch and German engineers, &c.

RHINOBATUS, in ichthyology, a species of the raja, with only a single row of prickles in the middle of the back. See the article **RAJA**.

RHINOCEROS, in zoology, an order of the jumenta, having eleven fore-teeth in each jaw; there are no canine teeth; the nose is ornamented with a single or double horn, which is permanent. This, of all quadrupeds, approaches nearest to the elephant in size, the body being nearly as bulky, but the legs much shorter. A full grown rhinoceros is fourteen feet high, and the legs are so short with all this height, that the belly comes near the ground: the head is very large and oblong, of an irregular figure, broad at top and depressed towards the snout: the ears resemble those of a hog: the eyes are very small, and situated at a small distance from the extremity of the snout: on the upper part of the snout, near the extremity, stands the horn, growing to about two feet and a half in length, bent a little back, of a black colour, and vastly firm and hard: the skin is remarkably thick and hard, so that the

creature could not turn its body in any direction but for the joints and folds in it: the tail is short, and furnished with some long and extremely thick black hairs. See plate CCXXXII. fig. 2. which represents a young rhinoceros with a short obtuse horn; there being some species which have the horn much longer.

RHINOCEROS BIRD, a large bird about the size of the european raven, which it greatly resembles: it is so called from a true horn, which, rising from the root of the beak, bends upwards. See plate CCXXXII. fig. 6.

There are other two varieties of this horn brought from the East-Indies, all belonging to different species of hydrocorax. See HYDROCORAX.

RHIZOPHORA, in botany, a genus of the dodecandria-monogynia class of plants, called, by Plumier, mangles: the flower is erect, being composed of a single petal, divided into four segments; the seed is single, very long, and of a clavated figure, pointed at the end.

RHODES, the capital of an island of that name, situated in the Mediterranean-sea, in east long. 28° , and between 36° and 37° north lat.

RHODIOLA, or **RHODIA**, in botany, a genus of the polygamia-dioecia class of plants, which produces two kinds of flowers, *viz.* hermaphrodite and female ones; both which are composed of four petals, only much longer in the hermaphrodite than in the female flowers: the fruit consists of four corniculated capsules, containing numerous roundish seeds.

RHODIUM LIGNUM, **RHODIAN WOOD**, in botany, the same with aspalathus. See the article ASPALATHUS.

Jamaica affords a wood, called, by the people there, rose-wood; which, though not the rhodium of the shops, has nevertheless much of its smell: it is described by Sir Hans Sloane to be a tree growing to twenty or more feet in height, and thick enough to afford the largest segments we ever meet with of it; and possibly an adulteration of the true rhodium with this wood may be the true cause why the rhodium is not allowed to be the root, but a species of cytissus, as Hoffman affirms.

The flowers of the Jamaica rose-wood are small and white, consisting of three petals, and standing in clusters: the fruit is a berry of the size of a pepper-corn; and the leaves of the tree are pinnated.

RHODODENDRUM, in botany, a genus

of the decandria-monogynia class of plants, the calyx of which is a permanent perianthium, divided into five segments; the corolla is a wheel shaped, funnel-shaped, single petal: the fruit is an oval angular capsule, containing five cells, in which are a great many very small seeds.

RHODON, in pharmacy, an appellation given to several compositions, on account of roses being the chief ingredient in them; as the diarrhodon, rhodosaccharum, &c. See DIARRHODON and ROSE.

RHOMBOIDES, in geometry, a quadrilateral figure whose opposite sides and angles are equal, but is neither equilateral nor equiangular; as the figure NOPQ, plate CCXXXII. fig. 5.

RHOMBOIDES, in anatomy, a thin, broad, and obliquely square fleshy muscle, situated between the basis of the scapula and the spina dorsi; so called from its figure. Its general use is to draw, backward and upward, the subspinal portion of the basis scapulæ.

RHOMBOIDIA, in natural history, the name of a genus of spars, given them from their being of a rhomboidal form. They owe this figure to an admixture of particles of iron, and consist of six planes. Of this genus there are only two known species. 1. A white, thin one, with very thin crusts; and, 2. A whitish brown thick one, with thicker crusts. These are both found in the forest of Dean in Gloucestershire, and in other places where there are iron-ores.

RHOMBUS, in geometry, an oblique-angled parallelogram, or a quadrilateral figure whose sides are equal and parallel, but the angles unequal, two of the opposite ones being obtuse, and the other two acute, as ABCD, plate CCXXXII. fig. 4.

To find the area of a rhombus, upon CD, assumed as a base, let fall the perpendicular Ae, which is the altitude of the figure; then multiply the base by the altitude, the product will be the area.

RHOMBUS, the PEARL-FISH, in ichthyology, a species of pleuronectes, with the eyes on the left side: it is a moderately large species, but is not so thick and fleshy as the turbot, nor is its flesh so well tasted. See the articles PLEURONECTES and TURBOT.

RHONE, one of the largest rivers in France, which rising in one of the Alps of Switzerland, passes through the lake of Geneva, visits that city, and then runs south-west to Lyons, where joining

the river Soane, it continues its course due south, passing by Orange, Avignon, and Arles, and falls into the Mediterranean a little westward of Marseilles.

RHOPALIC VERSES, in antient poetry, a kind of verses, which beginning with monosyllables, were continued in words growing gradually longer and longer to the last.

RHOPOGRAPHI, in antiquity, painters who confined themselves to low subjects, as animals, plants, landscapes, &c. See the article **PAINTING**.

RHUBARB, *rhabarbarum*, in pharmacy, a thick root, of an oblong figure, large at the head, and tapering pretty suddenly as it extends in length. It is sometimes single, but more usually divided into two or three parts at the lower end. We frequently meet with it in pieces of four, five, or six inches long, and three or four in diameter at the top; it is of a tolerably smooth and even surface, and externally of a faint yellow colour, with a large admixture of brown; it is moderately heavy but not hard; it cuts through very freely and easily with a knife, especially if the blade of it has been rendered a little unctuous first, by drawing it over an almond or any other fatty substance. When fresh cut it is found to be of a marbled or variegated appearance; its colours are a pale but bright yellow, and a faint reddish. The yellow is the ground-colour, and the red is disposed in short irregular veins, much in the manner of the darker colour in the common nutmeg. It is of a somewhat lax and spongy texture; it has an agreeable and aromatic smell, and a bitterish, astringent, and subacid taste, upon the whole not disagreeable: it tinges the spittle to a fine bright yellow on being held some time in the mouth.

Rhubarb is to be chosen fresh, tolerably hard and moderately heavy, and such as does not dust the fingers in handling; such as infused a few minutes in water gives it a fine yellow, and, when bruised in a mortar, has a reddish colour with the yellow. Rhubarb is not so often adulterated as damaged; care is to be taken that it be not wet, nor rotten; much of it is subject, after steeping too long, to be worm-eaten and full of holes on the surface. There are certain traders in this drug, who have a way of filling up these holes with the powder of some of the worst and most decayed pieces; but this

is easily discovered, and such rhubarb ought always to be rejected.

The antients were not acquainted with the true rhubarb: their rhubarb appears to be the rheum, or raphontic plant which, tho' Linnæus makes it the same with the rhubarb, is yet very different in quality if not in characters. See **RHEUM**.

The rhubarb is brought to us from Russia, and from the East Indies. It is produced in great plenty on the confines of China and Tartary, and in many parts of Tartary itself: the mountains of Tibet abound with it, and a very considerable part of what is sent into Europe grows there.

It was long before the rhubarb was known in Europe, but of late it has been sent from Russia to the gardens of Paris and Chelsea, in both which it thrives extremely well, and stands the severest colds unhurt. Other authors make it the *lepathum bardane folio undulato glabro*; and as there are sufficient proofs that we now have the true rhubarb among us, it will be easy to propagate a quantity of it, in order to try whether its virtues, when produced with us, will be the same with those it possesses as brought from its native climate. See **LAPATHUM**.

The root of the native rhubarb plant is long, thick, and perennial; its bark, while growing, is of a brownish red colour; but under this the substance of the root is of the true colour of dried rhubarb, only deeper, of the right nutmeg-grain, marbled with red and yellow, and has the true smell and taste of rhubarb, especially about the upper part of the root: it has a viscosity indeed in the mouth, tho' rhubarb, as we meet with it in the shops, has not; but this may only be the difference of the same root fresh and dried.

Rhubarb possesses the double virtue of a cathartic and an astringent; it readily evacuates particularly the bilious humors, and afterwards gently astringes and strengthens the stomach and intestines. It is given with great success in all obstructions of the liver, in the jaundice, in diarrhoeas, and in the fluor albus and gonorrhœas; it is also an excellent remedy against worms. It is sometimes given as a purgative, sometimes as only an alterant; and, which ever way it is taken, it is an excellent medicine, agreeing with almost all ages and constitutions. The only cases in which its use is

to be avoided, are those in which the blood and viscera are too hot. Fallopius says it is never to be given to people who have disorders of the kidneys or bladder, as it is apt to occasion an extraordinary heat in those parts; and Simon Pauli tells us of vertigoes brought on by a too free and continued use of it.

Rhubarb is given in powder in infusion, and in its own crude solid state; the chewing it perhaps being the best way of giving it of all others, when it is intended to strengthen the stomach and assist digestion; the quantity of twenty-five grains, or thereabout, should be chewed daily on those occasions, an hour before eating; this is also by much the best way of taking it against obstructions of the viscera. Its dose in powder is from half a scruple to two scruples; in infusion, about a drachm of it will purge gently; but the dose may be increased to two drachms. It is observable, that neither the infusion, nor the decoction, nor even the extract of rhubarb, purge near so briskly as the root itself in powder.

The preparations of rhubarb in use in the shops are, 1. The tincture in spirit. 2. The tincture in wine: and, 3. The extract; though the last is but little used.

Monk's RHUBARB, rhabarbarum. See the article RHAPONTICUM.

White RHUBARB, a name given to mechoacan. See the article MECOACAN.

RHUMB, RUMB, or RUM, in navigation, a vertical circle of any given place, or the intersection of such a circle with the horizon; in which last sense rhumb is the same with a point of the compass. See the article COMPASS.

RHUMB-LINE, loxodromia, is also used for the line which a ship describes when sailing in the same collateral point of the compass, or oblique to the meridians. Now that such rhumb-lines are spirals, which continually approach to the pole but never fall into it, as *Abcdefg*, plate CCXXXII. fig. 7. is evident for the following reasons. In any place on the surface of the globe, the rhumb running north and south, coincides with the meridian of that place; the east and west rhumbs are perpendicular to the meridian, and the other rhumbs are oblique to it; but this obliquity is the same under every meridian; and therefore all the rhumbs, except the north and south, cut the meridians at equal angles. When

right lines are parallel to each other, a right line will cut them at equal angles; but not so when they are inclined to one another: therefore several inclining lines cannot be cut at equal angles, but by a curve line bending towards the place where those lines would meet. Now the meridians being inclined to each other, and meeting in the poles, the oblique rhumbs must be curve-lines continually approaching the poles. But, in every latitude, an oblique rhumb runs between the present parallel and the pole; and a line cannot cut several other lines at equal angles in the same point: consequently the rhumb-lines are spirals, which continually wind round the poles without ever falling into them.

Again, that these spiral rhumbs, on the globe, are of the same kind with the proportional spiral, will appear hence: let *PABC*, &c. (*ibid.*) be the stereographic projection of part of the sphere, on the plane of the equator; where *ABCDEF* is part of the equator; *P* the pole; *PA*, *PB*, *PC*, &c. are meridians; and the spiral *Abcdefg*, one of the rhumbs. Now, in such a projection, the lines intersecting each other, form angles equal to the angles on the sphere which they represent: therefore the projection of the rhumb, *Abcd*, &c. cuts the radii, or meridians, *PA*, *PB*, *PC*, &c. at equal angles; and as this is a property of the proportional spiral, the spiral rhumbs must be analogous to the proportional spiral. Hence the differences of longitude *AB*, *AC*, *AD*, &c. are the logarithms of the intercepted parts of the meridians, *Pb*, *Pc*, *Pd*, &c.

RHUS, SUMACH, in botany, &c. the name given by Linnæus to a plant called *COTINUS* by other authors, and already described under that name. See also the article *SUMACH*.

RHYME, RHIME, RYME, or RIME, in poetry, the similar sound, or cadence and termination of two words which end two verses, &c. Or rhyme is a similitude of sound between the last syllable or syllables of a verse, succeeding either immediately or at a distance of two or three lines.

Rhymes are either single, double, or triple, though the two last are much disused. Single rhymes are divided into perfect or whole rhymes, and imperfect or half rhymes. A whole or perfect rhyme is where there is a similitude of sound without any difference: an imperfect rhyme

rhyme is where there is a similitude of sound, with a difference either in respect of the pronunciation or orthography, but chiefly the former. Single rhymes are again divided into feminine and masculine rhymes: the feminine rhyme is that where the last syllable of the rhyme ends with an *e* mute: and the masculine rhymes are those of all other words. Double rhymes are those where two words terminate alike through the whole two last syllables. Plain rhymes are those where the two rhyming verses succeed immediately to each other: and cross rhymes are those where the verses are so disposed as that the first rhymes with the third, and the second with the fourth.

There is no rule in poetry, says Du Bos, whose observance costs so much trouble, and is productive of less beauties in verse, than that of rhyming. Rhyme frequently maims and almost always enervates the sense of the discourse, for one bright thought which the passion of rhyming throws in our way by chance, is, without doubt, every day the cause of a hundred others that people would blush to make use of were it not for the richness or novelty of the rhyme with which these thoughts are attended.

And yet the allurements of rhyme has nothing in it worth comparing to the charms of numbers and harmony. The terminating of a syllable with a particular sound is no beauty in itself. The beauty of a rhyme is only a relative one, which consists in a conformity of termination between the two last or two corresponding verses. This ornament therefore, which is of so short a duration, is perceived only at the end of two verses, and after having heard the last word of the second verse, which rhymes to the first. One is not even sensible of this pleasure, but at the end of three or four verses, if the masculine and feminine rhymes are interwoven, so that the first and fourth be masculines, and the second and third feminines: a mixture which is very much used in several kinds of poetry. But even in those verses where the richness thereof discovers itself at the end of the second verse, it is the greater or lesser conformity between the two last words of these verses, which forms its elegance. Nor, for the most part, do people upon hearing the second rhyme, recal the first distinctly enough to be charmed with their perfection. Their merit is known rather by reflection than

sensation, so trifling is the pleasure by which it tickles the ear. Numbers and harmony are a light which throws out a constant lustre; but rhyme is a mere flash, that disappears after having given only a short-lived splendor. See the articles NUMBER, METRE, &c.

Rhyme owes its origin to the barbarousness of our ancestors. The people from whom the modern nations are descended, and who subverted the roman empire, had their poets, who being ignorant, and the languages in which they wrote not sufficiently improved to bear a handling according to the rules of metre, they fancied there would be some ornament in terminating with the same sound two consecutive or relative parts of a discourse, both of which were to be of an equal extent. Thus, in all probability, it was that rhyme first rose in Europe. These new-born languages were not only forced to submit to the slavery of rhyming, but it passed even to the latin tongue, the use of which was still retained by a particular set of people. The practice of leonine verse was introduced as early as the VIIIth century, and prevailed at the time the following ones were made,

*Fingitur hac specie bonitatis odore refertus,
Istius ecclesiæ fundator rex Dagobertus.*

These leonine verses disappeared upon the rising of that light, whose dawn appeared in the XVth century.

Since the restoration of learning in the XVIth century, attempts have been made to banish rhyme out of the modern poetry, and to settle the english and french verses on the footing of the antient greek and latin ones, by fixing the quantities of syllables and trusting wholly to those, and to the numbers and measure. This Milton has done with great success, and after him Philips, Addison, Thomson, Young, and some others. Verses of this kind are called blank verses. The French have attempted the same, but not with equal success; which has convinced the world, that this kind of measure is inconsistent with the french tongue.

RHYPTICS, *ῥυπτικά*, in medicine, detergent remedies. See DETERGENTS.

RHYTHM, *ῥυθμός*, in music, the variety in the movement, as to the quickness or slowness, length or shortness of the notes. Or it may be defined more generally, the proportion which the parts of the motion have to each other. See the next article. Aristides, among the antient musicians, applies the word *rhythmus* three ways,

viz.



Fig. 1. Astronomical RING.

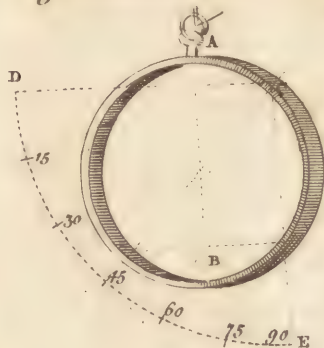


Fig. 2. The RING of a Roman Knight.



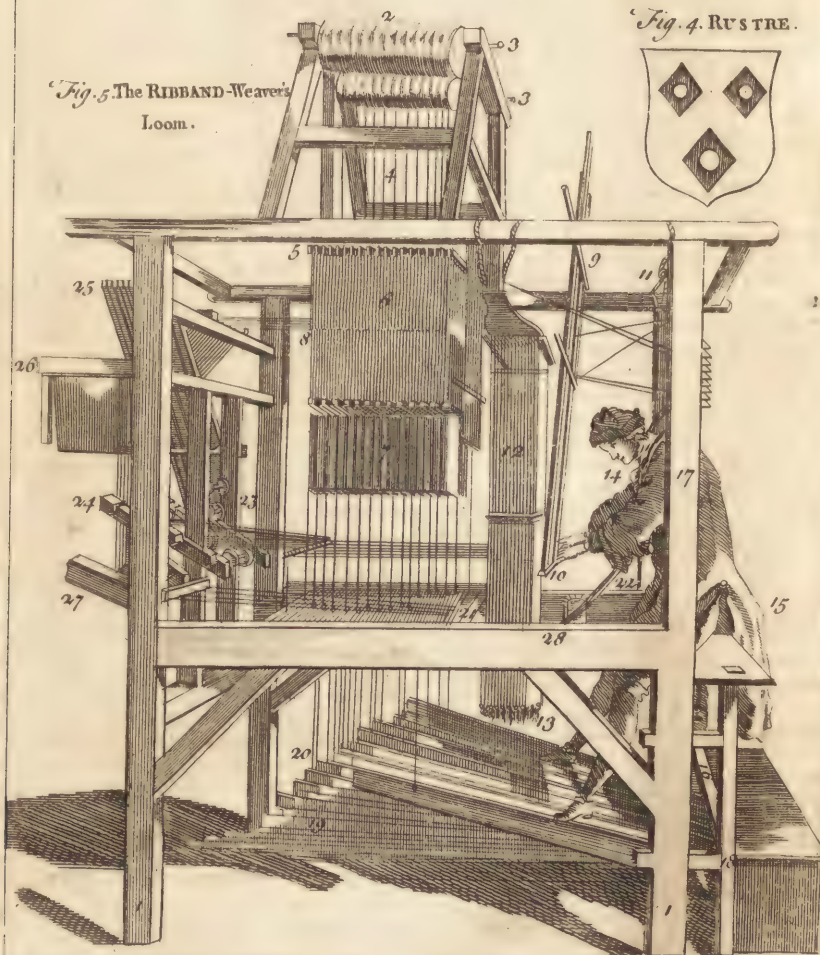
Fig. 3. ROMPEE.



Fig. 4. RU'S TRE.



Fig. 5. The RIBBAND-Weaver's Loom.



viz. either to immoveable bodies, when their parts are rightly proportioned to each other, as a well made statue, &c. Or to things that move regularly, as in dancing, in the dumb shews of pantomimes, &c. Or, thirdly, to the motion of sound, or voice, in which the rhythmus consists of short and long syllables, or notes, joined together in some kind of order, so as their cadence on the ear may be agreeable. This, in oratory, is what we call numerous style; and when the tones of the voice are well chosen, an harmonical style. See **STYLE**.

In effect, rhythm, in general, is perceived either by the eye or ear, and may be either with or without metre; but the strict rhythm of music is only perceived by the ear, and cannot exist without it. The first either exists without sound, as in dancing; or with sounds. It may be either without any difference of acute and grave, as in a drum; or with a variety of these, as in a song. The rhythm of the antients, Mr. Malcolm observes, was very different from that of the moderns: the former was only that of the long and short syllables of the words and verses, and had no other forms or varieties than what the metrical art afforded. The changes therein are nothing but those made from one kind of metre to another, as from iambic to choric, &c. In the modern music, the constitution of the rhythm differs from that of the verse so far, that in setting music to words, the thing chiefly regarded, is to accommodate the long and short notes to the syllables in such a manner as that the words be well separated, and the accented syllables of each word so conspicuous, that what is sung may be distinctly understood. See **MELODY**.

Vossius says, the rhythm, which does not express the very forms and figures of things, can have no effect; and that the antient poetical numbers alone are justly contrived for this end. He adds, that the modern languages and verse are altogether unfit for music; and that we shall never have any right vocal music, till our poets learn to make verses capable to be sung, *i. e.* till we new-model our language, restore the antient quantities and metrical feet, and banish our barbarous rhymes. Our verses, says he, run as it were all on one foot, so that we have no real rhythm at all in our poetry: and adds, that we mind nothing farther than to have such a number of syllables in a

verse, in whatever nature, and in whatever order.

RHYTHMICA, *judicium*, in the antient music, that branch which regulated the rhythm. See the preceding article.

The rhythmica considered the motions, regulated the measures, order, mixture, &c. so as to excite the passions, keep them up, augment, diminish, or allay them. Aristides, and other antient musical writers, divided artificial music into harmonica, rhythmica, and metrica. See the article **MUSIC**. But the rhythmica with them likewise comprehended dumb motions, and, in effect, all rhythmical, *i. e.* regular motions.

RHYTHMOPOEIA, one of the antient musical faculties, as they are called, which prescribes rules for motion, or rhythm.

The antient rhythmopoeia is very defective: we find nothing of it in their books but some general hints, which can scarce be called rules. In their explications, there appears nothing but what belongs to words and verses of their songs, which is a very strong presumption they had no other. See **RHYTHM**, and the preceding article.

RIAL, or **RYAL**, a spanish silver-coin. See the article **COIN**.

RIAL, or **ROYAL**, is also the name of a piece of gold, antiently current among us for ten shillings.

RIB, *costa*, in anatomy. See **RIBS**.

RIBBAN, or **RIBBON**, in heraldry, the eighth part of a bend, like that represented in plate CCXXXII. fig. 8.

RIBBAND, or **RIBBON**, a narrow sort of silk, chiefly used for head-ornaments, badges of chivalry, &c.

In order to give our readers an idea of the manner in which this curious and valuable branch of manufacture is managed, we shall present him with a view of the ribbon-weaver in his loom, as represented in plate CCXXXIII. fig. 5. where 1 is the frame of the loom. 2, The castle, containing forty-eight pullies. 3, The branches, on which the pullies turn. 4, The tires, or the riding-cords, which run on the pullies, and pull up the high-lisses. 5, The list-sticks, to which the high lisses are tied. 6, The high-lisses, or lists, are a number of long threads, with platines, or plate-leads, at the bottom; and ringlets, or loops, about their middle, through which the cords or cross-threads of the ground-harness ride. 7, The plate-leads, or platines, are flat pieces

pieces of lead, of about six inches long, and three or four inches broad at the top, but round at the bottom; some use black slates instead of them: their use is to pull down those lisses, which the workman had raised by the treddle, after his foot is taken off. 8, The branches or cords of the ground harness, which go through the loops in the middle of the high-lisses: on the well ordering of these chords chiefly depends the art of ribbon-weaving, because it is by means of this contrivance that the weaver draws in the thread or silk that makes the flower, and rejects or excludes the rest. 9, The batton; this is the wooden-frame that holds the reed, or shuttle, and beats or closes the work: where observe that the ribbon-weaver does not beat his work; but as soon as the shuttle is passed, and his hand is taken away, the batton is forced by a spring from the top, to beat the work close. 10, The shuttle, or reed. 11, The spring of the batton, by which it is made to close the work. 12, The long-harnesses are the front-reeds, by which the figure is raised. 13, The linguas are the long pieces of round or square lead, tied to the end of each thread of the long-harness, to keep them tight. 14, The broad piece of wood, about a foot square, leaning somewhat forward, intended to ease the weaver, as he stoops to his shuttle; it is fixed in the middle of the breast-beam. Some weavers, instead of this, have a contrivance of a cord or rope, that is fastened to the front frame, and comes across his breast; this is called a stopfall. 15, The seat-bench; this leans forwards very much. 16, The foot-step to the treddles. 17, The breast-beam, being a cross-bar that passes from one of the standards to the other, so as to front the workman's breast: to this breast-bar is fixed a roll, upon which the ribbon passes in its way to be rolled upon the roller, that turns a little below. 18, The clamps, or pieces of wood, in which the broaches, that confine the treddles, rest. 19, The treddles are long narrow pieces of wood, to the ends of which the cords, that move the lisses, are fastened. 20, The treddle-cords are only distinguished from the riding-cords by a board full of holes, which divide them, in order to prevent the plate-leads, which are tied to the high-lisses, from pulling them too high, when the workman's foot is off the treddle: which stop is made by a knot in the treddle-cord, too big to be forced through that

hole in the board. 21, The lames are two pieces of thin narrow boards, only used in plain works, and then to supply the place of the long-harness. 22, The knee-roll, by which the weaver rolls up his ribbon, as he sees proper, or by bit and bit, as it is finished. 23, The back-rolls, on which the warp is rolled. It is to be observed, that there are always as many rolls as colours in the work to be wove. 24, The clamps, which support the rollers. 25, The returning-sticks, or, as others call them, the returns, or the tumblers, or pullies, to which the tiers are tied, to clear the course of cords through the high-lisses. 26, The catch-board, for the tumblers. 27, The tire-board. 28, The buttons for the knee-rolls and treddle-board, described in number 20.

Ribbands of all sorts are prohibited to be imported.

RIBBAND-SCREW-SHELL, a species of turbo, with broad spiral fasciæ, and a small mouth. See the article TURBO.

RIBBLE, a river which rises in the west-riding of Yorkshire, and, running south-west cross Lancashire, falls into the Irish channel, below Preston.

RIBES, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of five small, obtuse, erect petals, inserted into the margin of the cup: the fruit is a globose, umbilicated berry, containing only one cell, with two lateral, opposite, longitudinal receptacles; the seeds are numerous, roundish, and somewhat compressed.

This genus comprehends the currant, the black currant, and the purple gooseberry.

RIBS, *costæ*, in anatomy, certain long arched bones, serving to form or sustain the inner sides of the thorax. See the article THORAX.

The ribs are twenty-four in number, twelve on each side; their figure is an imperfect segment of a circle; their size is very different, the middle ones being largest, and the upper and lower much smaller: they are harder, rounder, and more incurvated towards their articulations with the vertebræ, than at the other extremity towards the sternum, which is thinner, broader, and more spongy. The ribs are distinguished into true and spurious; the true ribs are the seven upper pair, which are thus distinguished, as forming the most perfect arches, and as having a strong articulation with the sternum. The five lower are called *nothæ*, or spurious ribs,

ribs, as being smaller, shorter, and more cartilaginous than the rest, and not reaching so far as the sternum, which make their articulations very lax, in regard they terminate in long soft cartilages, which, bending upwards, are joined to the upper ribs. The several ribs have been distinguished by many authors, each under its peculiar name; but this is not necessary, as they are as easily known by the names first, second, &c. On the inside of the true ribs, except the lowest, and sometimes the next to it, runs a pretty deep sinus, reaching from the end next the spine, almost to its juncture with the cartilage. In the anterior extremities the cartilages of the seven true ribs are all joined to the sternum; the eighth, ninth, and sometimes the tenth, cohere either with the sternum; or mutually adhere to one another, by means of their transverse cartilages. The anterior extremities of all the others are loose and free, between the muscles of the abdomen and the diaphragm. In the posterior extremities there are in most of them two capitula, or heads, which are firmly joined to the vertebræ of the back, yet so as to form moveable articulations; for the use of which, see the article RESPIRATION. The ribs are liable both to fractures and luxations. In a slight fracture, the separated bones are to be put into their places, a compress dipped in spirit of wine is to be laid on, and then covered with splints and a circular bandage. If any sharp pieces of the ribs should pierce the pleura, &c. it will be proper to open the skin, and extract the fragment. The ribs are but seldom dislocated; but when this happens, they are to be replaced as soon as possible. See the articles FRACTURE and LUXATION.

RICCIA, in botany, a genus of the cryptogamia-algarum class of plants, consisting of a foliaceous matter, procumbent on the ground, on which there are evident male and female fructifications, sometimes both on the same, and sometimes on different plants of the same species; the male flower has neither calyx nor corolla, but consists of a single anthera, of an oblong tubulated form, which grows to the leaves, without any pedicle: the female flower has no corolla, and scarce any calyx, it consists principally of a pericarpium of a globular figure, in which there are contained a number of seeds.

VOL. IV.

RICE, *oryza*, in botany and medicine. See the article ORYZA.

RICHARDIA, in botany, a genus of the hexandria-monogynia class of plants, the corolla whereof consists of a single petal, of an infundibuliform shape; the limb is divided into six parts, erect and acute; there is no pericarpium; the seeds are three, roundish, angular on one side, broadest upwards, and gibbous.

RICHLIEU, a town of France, in the province of Orleans and territory of Poitou, situated twenty-six miles north of Poitiers.

RICHMOND, a village in the county of Surry, ten miles west of London, formerly the residence of the kings of England.

RICHMOND is also a borough-town of Yorkshire, thirty-three miles north-west of York.

It sends two members to parliament.

RICINUS, in botany, a genus of the monœcia-polyadelphia class of plants, having no corolla, the fruit is a roundish trifolcated capsule, consisting of three valves, and containing three cells; the seed is single, and of a roundish figure.

RICKETS, *rhachitis*, in medicine, a disorder incident to children, proceeding from an unequal nutrition.

Children are seldom attacked with rickets before they are nine months old, and after they are two years old. It may originally proceed from the disorders of the parents, and may be increased by those of the nurse. It is also promoted by feeding the child with aqueous and mucous substances, crude summer-fruits, fish, and too great a quantity of sweet things; by sitting too much, especially in a perforated chair, with its coats up; by a striking in of the itch, &c.

This disorder is known from a flaccid tumour of the head and face, a flabby loose skin, a swelling of the belly, and a falling away of the rest of the other parts, especially of the muscles; from protuberances of the epiphyses of the joints, such as the wrists, ancles, and knees; from the largeness of the jugular veins and arteries, while the rest decrease; from knotty ribs, a narrow breast, and carious teeth, &c.

The cure, according to Boerhaave, is to be attempted with light, nourishing, dry aliment; not fat, but seasoned, and taken often; with little sound drink, such as mild beer, or ale; with dry warm air,

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and

and warm woolen clothing; with being carried about in the arms, or drawn in a vehicle over the stones, and often shook, swung, and put in motion; with repeated frictions, especially of the belly and spine of the back with warm dry flannel, sprinkled with aromatics; with gentle emetics, frequently tho' prudently repeated; with strengthening purges for several days successively; and with cold bathing, the child being put to sweat between blankets every day, as soon as he comes out of the water.

Particularly for food, the bread should be biscuit, with a little saffron and spices; the flesh should be pigeons, pullets, veal, rabbits, mutton gently roasted, minced and mixed with biscuit, salt, a little parsley, thyme, nutmeg, or the like. He may also eat rice, millet, or pearl-barley, boiled with raisins, to which add a little wine and spice. The drink may be red wine, of which an ounce may be given three or four times a day; as also brunswic mum and english beer, which, in the summer, may be mixed with spaw-water. Let the pillow and bed be filled with the following leaves dried in the shade, *viz.* of male-fern, three pounds; of marjoram, baum, and mint, each two handfuls; and of the flowers of melilot, sweet-trefoil, elder and roses, dried in the shade, of each two ounces: reduce them all to powder, and mix them with double the quantity of barley-chaff.

RIDE, in the sea-language, is a term variously applied: thus, a ship is said to ride, when her anchors hold her fast, so that she does not drive, by the force either of the wind or tide. A ship is said to ride across, when she rides with her fore and main yards hoisted up to the hounds, and both yards and arms topped alike. She is said to ride well, when she is built so as not to over-beat herself in a head-sea, the waves over-raking her from stem to stern. To ride athwart, is to ride with her side to the tide. To ride betwixt wind and tide, is to ride so as the wind has equal force over her one way, and the tide the contrary way. If the wind has more power over the ship than the tide, she is said to ride wind-road, or to ride a great wind. And she is said to ride a portoise, when the yards of a ship are struck down upon the deck. For to ride hawsefull, a-peek, or land-locked, see **HAWSES**, **PEEK**, and **LAND**.

RIDE, of hazel, or other wood, is a cluster

of sprigs shooting out from the same root.

RIDEAU, in fortification, is a small elevation of earth, extending lengthwise on a plane, and serving to cover a camp, or to give an advantage to a post. Rideaus are also convenient for those who would besiege a place, and serve to secure the workmen in their approaches to the foot of a fortress.

Rideau is also used sometimes for a trench, the earth of which is thrown upon its sides, to serve as a parapet for covering the men.

RIDER, a term used for an after-clause added to a bill, while depending in parliament.

RIDER-ROLL. See the article **ROLL**.

RIDERS, in a ship, are large timbers, both in the hold and aloft, bolted on to other timbers to strengthen them, when the ship is discovered to be too slightly built.

Out RIDERS. See **OUT-RIDERS**.

RIDGE, in agriculture, a long piece of rising land, between two furrows.

Mr. Tull observes, that the method of ploughing lands up into ridges is a particular kind of tillage, the chief use of which is the alteration it makes in the degrees of heat and moisture. But the principal advantage this gentleman proposes from ridges is the draining wet hills, where the upper stratum is mould, and the second stratum clay. These ridges, he observes, should be plowed across the hill, almost horizontally, that their parting furrows lying open, may each serve as a drain to the ridge next below it; for when the plough has made the bottom of these horizontal furrows a few inches deeper than the surface of the clay, the water will run to their ends very securely, without rising into the mould, provided no part of the furrows be lower than their ends. These ridges and their parting furrows must be made more or less oblique, according to the form and declivity of the hill; but the more horizontal they are, the sooner the rain-water will run off the lands: for in that case, it will run to the furrows, and reach them at right angles. Every one of these horizontal trenches receives all the water from the rills, or little gutters, which in these quagmire-hills, run betwixt the mould and the clay; these are all cut off by the trenches, which receive the water at their upper sides, and carry it away, as the gutters of lead, placed under the

caves

eaves of a house, carry away the rain-water.

These ridges should be plowed in pairs, without throwing any earth into the trenches; and at every time of plowing, the pairs must be changed, so that the furrow which had two ridges turned towards it one time, must have two turned from it the next.

RIDGE, in building, the highest part of the roof or covering of a house.

RIDGES of a horse's mouth, are wrinkles or risings of flesh in the roof of the mouth, running a cross from one side of the jaw to the other, with furrows between them. On the third or fourth of these ridges the farriers strike with a horn, in order to bleed a horse, whose mouth has been over-heated.

RIDGLING, or **RIDGEL**, among farriers, &c. the male of any beast that has been but half gelt.

RIDICULE, in matters of literature, is that species of writing, which excites contempt with laughter.

The objects of ridicule are falshood, incongruity, impropriety, or turpitude of certain kinds: but as the object of every excited passion must be examined by reason, before we can determine whether it be proper or improper; so ridicule must, apparently at least, establish the truth of the improprieties, designed to excite the passion of contempt. Hence, it comes in to the aid of argument and reason, when its impressions on the imagination are consistent with the nature of things; but when it strikes the fancy and affections with fictitious images, it becomes the instrument of deceit. But however ridicule may impress the idea of apparent turpitude, or falshood, in the imagination; yet still reason remains the supreme judge: and thus ridicule can never be the final test or touch-stone of truth and falshood, as has been observed by lord Shaftesbury.

RIDING, a division of Yorkshire, of which there are three, *viz.* the east, west, and north ridings.

In all indictments in that county, both the town and riding must be expressed.

RIDING CLERK, one of the six clerks in chancery, who, in his turn, annually keeps the controlment-books of all grants that pass the great seal that year.

RIENS ARREAR, in law, is a plea used in an action of debt, for arrearages of accounts, by which the defendant alleges, that there is nothing in arrear.

RIENS PASSE PAR LE FAIT, NOTHING PASSES BY THE DEED, is the form of an exception, in some cases taken to an action. See the article EXCEPTION.

RIENS PAR DESCENT, NOTHING BY DESCENT, is the plea of an heir, sued for his ancestor's debt, though he has no lands from him by descent, nor assets in his hands. See the article DESCENT.

RIER, or **REER-COUNTY**, in law, is opposed to full and open county, and, in our statutes, is taken to be some public place appointed by the sheriff, for the receipt of the king's money, after the end of the county-court.

RIES, a town of Provence, in France, twenty-seven miles north-east of Aix.

RIETI, a town of Italy, in the territory of the pope and duchy of Spoleto, sixty-three miles east of Rome.

RIEUX, a town of France, in the province of Languedoc, twenty-two miles south of Toulouse.

RIGA, a port-town of Livonia, one of the best harbours and trading towns in the Baltic: east long. 24°, north lat. 57°.

RIGADOON, a gay and brisk dance, borrowed originally from Provence in France, and performed in figure, by a man and a woman.

RIGEL, the same with regel. See the article REGEL.

RIGGING of a ship, is all her cordage and ropes, belonging to her masts, yards, &c. See the articles SHIP, ROPE, CORDAGE, &c.

A ship is said to be well rigged, when all her ropes are of a fit size and proportion: and she is said to be over-rigged, when her ropes are too large; which is of great prejudice to her sailing, and is apt to make her heel.

RIGHT, in geometry, signifies the same with straight: thus, a straight line is called a right one. See LINE.

As for right angle, right ascension, right cone, right descension, right sine, right sphere, &c. they are explained under the articles ANGLE, ASCENSION, &c.

RIGHT, jus, in law, not only denotes property, for which a writ of right lies, but also any title or claim, either by virtue of a condition, mortgage, &c. for which no action is given by law, but an entry only. See the articles JUS, ENTRY, PROPERTY, &c.

By stat. 1 Will. & Mar. cap. ii. the following particulars relating to the ill conduct of king James II. were declared to be illegal, and contrary to the antient

rights and liberties of the people, *viz.* his exercising a power of dispensing with, and suspending, of laws; his levying money without consent of parliament; violating the freedom of elections; causing partial and corrupt jurors to be returned on trials, excessive bail to be taken, and excessive fines to be imposed, as well as cruel punishments to be inflicted, &c.

RIGIDITY, in physics, denotes a brittle hardness. See the article **HARDNESS**.

It is opposed to ductility, malleability, and softness. See **DUCTILITY**, &c.

RIGLET, or **REGLET**. See **REGLET**.

RIGNANO, or **REGUANO**, a town of Italy, in the territories of the pope and St. Peter's patrimony, fifteen miles north of Rome.

RIGOL, a kind of musical instrument, consisting of several sticks bound together, only separated by beads. It makes tolerable music, on being well struck with a ball at the end of a stick.

RIGOR, in medicine, a convulsive shuddering, from severe cold, an ague-fit, or other disorder.

RIM, in a watch, or clock, the edge or border of the circumference or circular part of a wheel.

RIME, or **RHYME**, in poetry. See the article **RHYME**.

RIMINI, a port town of Italy, in the territories of the pope, and province of Romania, situated on the gulph of Venice: east long. $13^{\circ} 30'$, and north lat. $44^{\circ} 8'$.

RIND, the skin of any fruit that may be cut off or pared.

The outer coat of the chestnut, set with prickles, is particularly termed the urchin-like rind.

Rind is also used for the inner bark of trees or that whitish soft substance which adheres immediately to the wood.

In the modern theory of vegetation, the sap is supposed to pass through the rind, in its return from the extremities of the branches to the root. Others suppose its vessels to do the office of arteries, whence Mr. Bradley calls them arterial vessels.

RING, an ornament of gold, silver, &c. made of a circular form, and generally worn on the finger. That worn by the ancient roman knights is represented in plate CCXXXIII. fig. 2.

Nuptial or wedding rings were used by the ancient Greeks and Romans; and from them the christians took them up very early, as appears from Tertullian, and some ancient liturgies, where we find

the form of blessing the nuptial ring. See **MARRIAGE** and **NUPTIAL RITES**.

The episcopal ring is also of very antient standing; it makes a part of the pontifical apparatus, and is esteemed a pledge of the spiritual marriage between the bishop and his church.

There is scarcely any part of the body on which rings have not been worn. In India, the people commonly wear them on the nose, lips, cheeks, and chin. As to the ears, the custom still obtains of wearing rings in them, both by men and women, throughout the greatest part of the world. When Peter Alvarez had his first audience of the king of Calicut, he found him covered with stones set in rings, both in his hands, fingers, feet, and toes: and Louis Bartome represents a king of Pegu with precious stones on every toe.

Rings have been also used as seals. See the article **SEAL**.

RING, in navigation and astronomy, a brass-instrument, made in the form of a ring, and serving to take altitudes of the sun. See plate CCXXXIII. fig. 1.

At C is a small hole, in the direction CD, which is perpendicular to CE; this hole is precisely 45° from A, and CE is parallel to the vertical diameter AB. From C, as a center, they describe a quadrant of a circle CED; which being nicely divided into 90° , they mark upon the internal surface of the ring the places where rays, drawn from C, to these degrees, cut the said surface.

To use this ring, they hold it up by the swivel, and turn the side with the hole C, towards the sun; and then the sunbeams passing through the hole, make a luminous spot among the degrees, whereby the altitude is found. Some prefer the ring to the astrolabe, by reason its divisions are larger: however, it is far from being exact enough to be much depended on in astronomical observations, which are better made by quadrants. See **ASTROLABE** and **QUADRANT**.

RING-BONE, in farriery, a hard callous substance, growing in the paster of a horse, above the coronet: it is thus called from it growing quite round like a ring.

RING-DIAL. See the article **DIAL**.

RING-OUZEL, in ornithology, a species of black turdus, with a white ring, a little larger than the common black-bird. See the article **TURDUS**.

RING-

RING-WORM, in medicine, the same with the *serpigo*. See the article *SERPIGO*.

Fairy-RING, or *CIRCLE*. See the article *FAIRY-RING*.

Saturn's RING, in astronomy. See the article *SATURN*.

RING-WOOD, a market-town of Hampshire, twenty-five miles south-west of Winchester.

RIO GRANDE, a river of Terra Firma, which rising almost under the equator, and running north, falls into the north sea between Carthage and St. Martha.

RIO GRANDE is also a river of Africa, which runs from east to west through Negroland, and falls into the Atlantic ocean, in 11° north latitude.

RIO JANEIRO, a river of south America, which rises in the mountains west of Brazil, and falls into the Atlantic ocean almost under the tropic of capricorn.

RIONDO, in ichthyology, a species of red zeus, with an even tail, and the rostrum turned upwards. See *ZEUS*.

RIOM, a town of the Lignonis, in France, seven miles north of Clermont.

RIOT, in law, is where three or more persons, assembled together, commit some unlawful act, with force and violence, to the disturbance of the peace; as beating some person, forcibly entering upon the possession of the lands, houses, &c. of another, or breaking down inclosures, houses, &c.

By stat. 1 Geo. I. cap. v. if any persons to the number of twelve or more, unlawfully and riotously assembled, continue together for an hour, after being required, by a justice of the peace, or other magistrate, to disperse, they shall be deemed guilty of felony without benefit of clergy. However, prosecutions upon this statute, must be begun within one year after the offence is committed.

RIPAILLE, a town of Savoy, situated on the south side of the lake of Geneva, twenty miles north-east of that city.

RIPEN, a city and port-town of north Jutland, subject to Denmark.

RIPENERS, in surgery, medicines that promote suppuration, otherwise called *suppuratives*. See *SUPPURATIVES*.

RIPPON, a borough-town of Yorkshire, twenty-one miles north-west of York.

It sends two members to parliament.

RISING, *ortus*, in astronomy, the appearance of the sun, a star, &c. above the horizon of any place.

There are three kinds of poetical rising

of the stars, *viz.* *acronychal*, *cosmical*, and *heliacal*. See *ACRONYCHAL*, &c. The heavenly bodies always appear above the horizon before they really arrive at it, on account of refraction. See the article *REFRACTION*.

RISK, or *HAZARD*, in gaming, &c. See the articles *CHANCE*, *HAZARD*, &c.

RITE, *ritus*, among divines, denotes the particular manner of celebrating divine service, in this or that country. See the article *RITUAL*.

RITORNELLO, or *REPEAT*, in music, the burden of a song, or the repetition of the first or other verses of a song at the end of each stanza or couplet.

Custom has extended the use of the word to all symphonies played before the voices begin; and which serve by way of prelude to what follows.

In the partitions of the score of the Italian music, we frequently find the *ritornellos* signified by the words *si suona*, to shew that the organ, spinet, harpsichord, or the like, are to repeat some bars of what the voice has been singing. See the article *REPETITION*.

RITUAL, a book directing the order and manner to be observed in celebrating religious ceremonies, and performing divine service in a particular church, diocese, order, or the like.

The antient heathens had also their rituals, which contained their rites and ceremonies to be observed in building a city, consecrating a temple or altar, in sacrificing, deifying, &c.

RIVA, a city of Italy, at the north end of the Lake de Garda, sixteen miles south west of Trent.

RIVADEC, a city and port of Spain, in the province of Galicia; west long. 7° 10', north lat. 43° 36'.

RIVAL, a term applied to two or more persons, who have the same pretensions, and which is properly applied to a competitor in love, and figuratively to an antagonist in any other pursuit.

RIVER, *fluvius*, or *flumen*, a current, or stream of fresh water flowing in a bed or channel, from its source into the sea. See the article *SPRING*.

The great, as well as the middle-sized rivers, proceed either from a confluence of brooks and rivulets, or from lakes; but no river of considerable magnitude flows from one spring, or one lake, but is augmented by the accession of others, Thus the Wolga receives above two hundred

hundred rivers and brooks before it discharges itself into the Caspian Sea; and the Danube receives no less, before it enters the Euxine Sea. Some rivers are much augmented by frequent rains, or melted snow. In the country of Peru, and Chili, there are small rivers, that only flow in the day; because they are only fed by the snow upon the mountains of the Andes, which is then melted by the heat of the sun. There are also several rivers upon both sides the extreme parts of Africa, and in India, which for the same reason are greater by day than by night. The rivers also in these places are almost dried up in summer, but swell and overflow their banks in winter, or in the wet season. Thus the Wolga in May and June is filled with water, and overflows its shelves and islands, though at other times of the year it is so shallow, as scarcely to afford a passage for loaded ships. The Nile, the Ganges, the Indus, &c. are so much swelled with rain or melted snow, that they overflow their banks; and these deluges happen at different times of the year, because they proceed from various causes. Those that are swelled with rain, are generally highest in winter, because it is usually then more frequent than at other times of the year; but if they proceed from snow, which in some places is melted in the spring, in others, in summer, or between both, the deluges of the rivers happen accordingly. Again, some rivers hide themselves under ground, and rise up in other places, as if they were new rivers. Thus the Tigris meeting with mount Taurus, runs under it and flows out at the other side of the mountain: also, after it has run thro' the lake Tospia, it again immerges, and being carried about eighteen miles under ground, breaks out again, &c.

The channels of rivers, except such as were formed at the creation, Varenius thinks, are artificial. His reasons are, that, when a new spring breaks out, the water does not make itself a channel, but spreads over the adjacent land; so that men were necessitated to cut a channel for it, to secure their grounds. He adds, that a great number of channels of rivers are certainly known from history to have been dug by men.

The water of most rivers flow impregnated with particles of metals, minerals, &c. Thus some rivers bring sands in-

termixed with grains of gold; as Japan, Peru, and Mexico, Africa, Cuba &c. particularly in Guinea is a river where the negroes separate the gold-dust from the sand, and sell it to the Europeans who traffic thither for that very purpose. The Rhine in many places is said to bring a gold mud. As to rivers that bring grains of silver, iron, copper, lead &c. we find no mention of them in authors; though, doubtless there are many, and it may be to them that mineral waters owe many of their medicinal virtues. See MINERAL,

Theory of the motion of RIVERS. The running of rivers is upon the same principle as the descent of bodies on inclined planes; for water no more than a solid can move on an horizontal plane, the re-action of such a plane being equal and contrary to gravity, entirely destroys it, and leaves the body at rest: here we speak of a plane of small extent, and such as coincides with the curved surface of the earth. But if we consider a large extent or long course of water, then we shall find that such water can never be at rest, but when the bottom of the channel coincides every where with the curved surface of the earth.

Let ADF (plate CCXXXIV. fig. 1. n° 1.) be the curved surface of the earth, C its center, CD, CE two right lines drawn from thence, and EG a tangent to the earth in the point D. Then it is plain if BD were a channel of water, the water could not run, or move, because they are every where at an equal distance from the center C, and therefore equally affected by gravity. But if there be any place above the surface of the earth, as E, where water can be found, 'tis evident that water can descend in a channel to any part of the earth's surface, between B and D, because every point in the line ED is nearer to the center of the earth, and therefore below the point or place E; and its velocity will be so much the greater as it tends to a point nearer B, and slowest of all, when it moves in the direction of the tangent ED. See the article FLUID.

Hence it appears that the source E of all rivers and streams must be more than a semi-diameter of the earth CB distant from the center C. And since all great rivers run to the sea or ocean where they disembogue their waters at the point D, the line DC is a semi-diameter, and

Fig. 1. Motion of RIVERS.

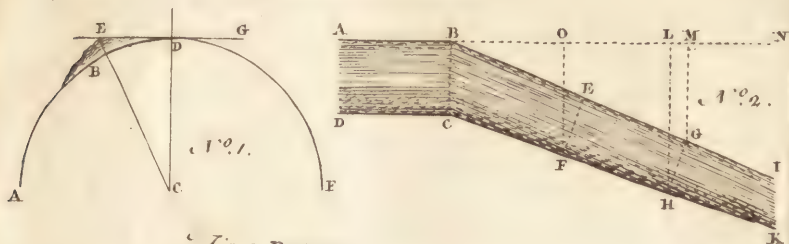


Fig. 2. ROCKETS.

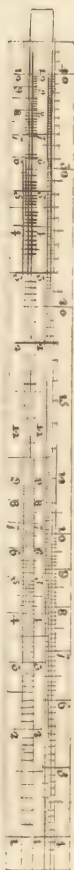
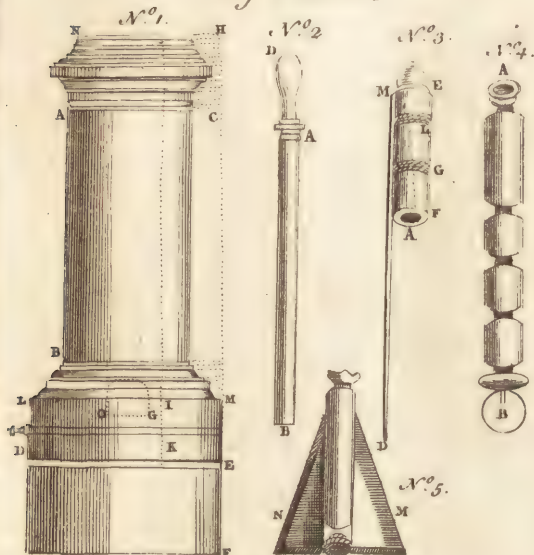


Fig. 4 Cogeshall's sliding Rule.

Fig. 3. The ROSE.





= 4000 miles nearly. Also the course of all long rivers being in the direction of the tangent at the point D, if they were represented by the tangent-line E G, then the height of the source E above the common surface of the earth at B would be easily found. Thus, suppose E D were the river Niger in Africa, whose source is more than 3000 miles from the sea; but put E D = 3000, and since C D = 4000, we shall have C E = 5000, and C E - C B = 1000 = B E = the height of the source. But since we know of no mountains above three or four miles high, it is plain the river Niger, and all such long rivers, are so far from moving in a tangent, that their course must be very nearly of the same curvature with the earth's surface, and insensibly distant from it.

Since bodies move on planes ever so little inclined, except so far as they are prevented by friction, and since the friction of the particles of water among themselves is inconsiderable, it follows that the water situated on a plane ever so little inclined, will commence a motion; and if the plane be considerably inclined, and the quantity of water great, its velocity will be proportional, and its momentum such as will soon begin to wear away the earth, and create itself a course or channel to glide in. In rivers that are made, it is usual to allow the fall of one foot in 300.

If we allow the same declivity to rivers which make their own way, then we find their height at their source above the common surface of the sea, as in example of the Niger thus: As 300 : 1 :: 5280 :

$\frac{5280}{300}$ = the height at one mile, or 5280

feet. Then again say, as 1 : $\frac{5280}{300}$:: 3000 :

$\frac{5280 \times 3000}{300}$ = 5280 \times 10 = 10 miles.

From whence it is evident, that the continents and islands ought to be much above the surface of the sea, to give a necessary descent and course to the waters through them.

Let A B C D (*ibid.* n.º 2.) be the section of a reservoir, and B C I K the section of a canal of water supplied from thence, and A B N the horizontal line. Now, since the particles of water are governed by the common laws of gravity, the velocity of a particle at any part of the bottom of the canal, as F or H, will be

the same as it would acquire by falling through the perpendicular altitude O F or L H, that is, as $\sqrt{O F}$ to $\sqrt{L H}$. Hence the velocity of the stream is accelerated. For the same reason the velocity of a particle at the bottom of the stream H is to the velocity of a particle at the top G, as $\sqrt{L H}$ to $\sqrt{M G}$; consequently the stream moves with greater celerity at bottom than at top.

The quantity of the water which passes through the section of the stream H G, is the same that passes through the section of the reservoir B C in the same time. The same may be said of any other section F E; therefore the quantity of water, passing by any two sections of the stream F E and G H, in the same time, is the same.

Since there runs the same quantity of water by G H as by F E in the same time; and since the velocity at G H is greater than at F E; and, lastly, since the breadth of the canal is supposed to be everywhere the same; therefore it follows, that the depth G H must be less than the depth F E, and so the depth of the stream must continually decrease as it runs.

As the stream proceeds, the depth H G decreasing, the lines M G and L H will approach nearer to an equality; and therefore the different velocities of the water at top and bottom will approach much faster to an equality, as being proportionate to the square roots of those lines. This approach to an equality is much farther promoted, by the upper parts being continually accelerated by the lower, and the lower parts retarded continually by the slower motion of the waters above, and pressing upon them.

Since the difference of the descending velocities is greatest near the head of the stream, the waters will there fall or descend with the greatest impetuosity, or cause the loudest noise. But in the course of rivers, the accelerated velocity is quickly reduced to an equable or uniform velocity, by the resistance it meets with from the bottom and sides of the channel, which resistance will be as the squares of the velocities, and therefore soon become so great as to equal the accelerating force, and be communicated to the middle part of the stream, causing the whole to move uniformly. Hence, in rivers, the motion of the water is slowest at the sides and bottom of the channel,

channel, because there the resistance begins, which is afterwards communicated to all the other parts; and in different parts of the same river, the uniform velocity is greatest, where the bottom of the channel has the greatest inclination, or declivity, because the relative gravity of the moving particles is here greatest. Again, in those parts of the river where the velocity of the stream is least, the depth of the water is greatest, and vice versa, because equal quantities pass thro' unequal sections of the river in the same time. Hence also it follows, that the momentum of running water must be every where the same, or a given quantity.

RIVINIA, or **RIVINA**, in botany, a genus of the tetrandria-monogynia class of plants, without any flower petals: the fruit is a globose berry, containing a single roundish and compressed seed.

RIVULET, a diminutive of river. See the article **RIVER**.

RIX-DOLLAR, a silver-coin, current in different parts of Europe. See **COIN**.

ROACH, in ichthyology, a species of cyprinus, with the iris and belly-fins usually red: it is generally, when full grown, nine inches long, but it sometimes grows considerably larger. See the article **CYPRINUS**.

ROACHING of *alum*, is the last process in making of alum, which, being sufficiently washed in a cistern of strong alum-water, is put into large pans, and a quantity of water added to it; and then being set over the fire to melt, and boil a little, it is scooped into a great cask, where it is suffered to stand and crystallize, and is what they call roach, roached, or rock alum. See **ALUM**.

ROAD, an open way, or public passage, forming a communication between one place and another.

Of all the people in the world the Romans took the most pains in forming roads, and the labour and expences they were at in rendering them spacious, firm, strait, and smooth, is incredible. They usually strengthened the ground by ramming it, laying it with flints, pebbles or sand, and sometimes with a lining of masonry, rubbish bricks, &c. bound together with mortar. In some places in the Lioinois, F. Menestrier observes, that he has found huge clusters of flints cemented with lime, reaching ten or twelve feet deep, and making a

mass as hard and compact as marble, and which, after resisting the injuries of time for 1600 years, is still scarce penetrable by all the force of hammers, mattocks, &c. and yet the flints it consists of are not bigger than eggs. The most noble of the roman roads was the *Via Appia* which was carried to such a vast length that Procopius reckons it five days journey to the end of it, and Leipsius computes it at 350 miles: it is twelve feet broad, and made of square free-stone generally a foot and a half on each side and though this has lasted for about 1800 years, yet in many places it is several miles together as entire as when it was first made.

The antient roads are distinguished into military roads, double roads, subterraneous roads, &c. the military roads were grand roads, formed by the Romans for marching their armies into the provinces of the empire; the principal of these roman roads in England, are Watling-street, Ikenild-street, Foss-way and Erminage-street. Double roads among the Romans, were roads for carriages, with two pavements, the one for those going one way, and the other for those returning the other: these were separated from each other by a causeway raised in the middle, paved with bricks for the conveniency of foot passengers with borders and mounting stones from space to space, and military columns to mark the distance. Subterraneous roads are those dug through a rock, and levelled; as that of Puzzoli near Naples which is near half a league long, and fifteen feet broad, and as many high.

For the english roads, see the article **HIGHWAY**.

ROAD, in navigation, is a place of anchorage at some distance from shore where vessels usually moor, to wait for wind or tide proper to carry them into harbour, or to set sail.

When the bottom is firm, clear of rock and sheltered from the wind, it is called a good road; and when there is but little land on any side, it is termed an open road.

The roads in his majesty's dominion are free to all merchant vessels, belonging to his subjects and allies. Captain and masters of ships who are forced by storms, &c. to cut their cables, and leave their anchors in the roads, are obliged to fix marks or buoys, on pain of forfeiting

forfeiting their anchors, &c. Masters of ships coming to moor in a road, must cast anchor at such a distance, as that the cables, &c. do not mix, on pain of answering the damages; and when there are several vessels in the same road, the outermost to the sea-ward is obliged to keep a light in his lanthorn in the night-time, to apprise vessels coming in from sea.

ROADER, among sailors, a ship that rides at anchor in a road.

ROAN. See the article **ROUEN**.

ROANE, a town of France, in the province of Lioinois, forty miles north-west of Lyons.

ROANOAK, an island in North America, near the coast of Albemarle-county, in North Carolina: west long. 75°, north lat. 35° 40'.

ROASTING, in metallurgy, the separation of volatile bodies from those which are more fixed, by the combined action of air, and fire; and is generally the first process in the separation of metals from their ores: it differs from sublimation only in this, that in this operation the volatile parts are dissipated, when resolved into vapours; whereas in that, they are preserved. See **SUBLIMATION**. Sulphur and arsenic are in this manner collected, and preserved, in the roasting of many ores; and sublimation made, as it were, occasionally in the process.

The separation of the volatile parts of bodies, from the more fixed is, however, in many cases very difficult, and much nicety is required in the conducting this operation; this is the case, for instance, when the whole compound body melts in almost the same degree of fire that is necessary to raise, and dissipate the volatile parts in the air; in such cases, care must be taken, first previously to pound a little the body to be roasted, that its surface contiguous to the air may be increased in extent. A gentle fire is also necessary on such occasions, and a very free access of the air, which is the vehicle of these vapours. When the body in the roasting grows on these occasions into large lumps or clots, the surface of it must be restored to the necessary extent, by repeated poundings, for it is necessary above all things, that the matter be kept extended and recent, and never collected into a heap.

Roasting, as commonly practised, is subject to many inconveniencies, which may

be most of them easily remedied, and the whole business reduced to a few easy rules. 1. The roasting of ores should be always performed, without addition, when the ores are rich, or of itself merely of a metallic nature. But the additions of quicklime, potashes, iron-silings, and the like, are necessary, when arsenical, antimonial and sulphureous matters are found to be mixed with the ores. 2. The fire is to be so regulated from the first, that only the lighter or more volatile sulphureous or arsenic fumes may fly off, otherwise the more metallic part would likewise go, and without some contrivance to catch it would be lost. The ore must, however, always feel the force of an open flame, otherwise the sulphur, arsenic, &c. will never be thoroughly dislodged. 3. The more these immature substances abound in ore, the gentler the fire should be at first; and when the greater part of the sulphureous matter is thus exhaled, the fire is then to be quickened. 4. Where such additions are used, as are not metalline, as lime, mud, pot-ash, &c. they ought always to be separated afterwards from the matter before the fusion, by washing.

ROB, in pharmacy, the juices of fruits purified and inspissated till it is of the consistence of honey.

Rob of alderberries is thus prepared: Take two quarts of the juice of alderberries, and half a pound gentle fined sugar. Evaporate over a due fire, or in a water-bath, till the consistence.

ROBBERY, in law, goods, from his away another or estate, by putting person, present him in fear, the highway, is felony without Robbery of clergy, though the sum or out be taken be under twelve-pence, or value be no more than a single penny: if any thing be taken from the person of another without putting him in fear, this is properly no robbery, but felony, in which benefit of clergy is allowed; the putting in fear being the chief article that distinguishes robbery from stealing from a man's person.

In the case of robberies, there is therefore, a taking in deed, which is the very act; and a taking in law, as where a robber compels a man, from the fear of death, to swear he will bring him a sum of money, which the sworn person delivers

livers to the other. The streets in cities are made highways, in respect to robberies, by 6 Geo. I. Persons who assault, or in a forcible manner demand money of another, with an intent to commit a robbery, are guilty of felony, and are to be transported for seven years.

The hundred in which a robbery on the highway is committed, is liable to pay the damage, when it is committed between the rising and setting of the sun, in any day, except Sunday, in case the robbers are not taken in forty days; hue and cry being made after the robber. And he who apprehends and prosecutes a robber on the highway, so as to convict him, is intitled to receive of the sheriff of the county where the robbery was committed, the sum of 40 l. with the horse, furniture, arms, &c. upon such person's producing a proper certificate from the judge before whom the robber was convicted.

House ROBBERING. See the article HOUSE-BREAKING.

ROBE, a garment of state, being a kind of gown, which hangs loose, and covers the whole body.

Master of the ROBES. See the article MASTER of the Wardrobe.

ROBERVALLIAN LINES, certain lines used for the transmutation of figures, and so called from their inventor M. de Roberval.

ROBILIA, or RUEIGALIA. See the **ROBINIBIGALIA**.

diadelphian botany, a genus of the a papilionacædia class of plants, with large and long pflower; its fruit is a gibbose shape, and a compressed and kidney-shaped seeds, containing a few

ROBORANTS, *roborantia*, medicines which strengthen pharmacy, and give new vigour to the cœ parts. See the article STRENGTHENER.

ROCAMBOLES, in cookery, a mild of garlic, by some called *spanish garl*. See the article **GARLIC**.

ROCELLA, in commerce, &c. the same with the alga tinctoria, used by the dyers for a purple colour. See the article **ALGA**.

ROCHDALE, a market-town, thirty two miles south-east of Lancaster.

ROCHEFOUCAUT, a town of Orleans, in France, fifteen miles east of Angoulême.

ROCHELLE, a city and port town of

Orleans, in France: west long. 1° 5', north, lat. 46° 7'.

ROCHESTER, a city of Kent, situated on the river Medway, thirty miles east of London, and twenty-two west of Canterbury.

Rocheſter bridge, over the Medway, makes a fine appearance, having an iron palſſade running its whole length on each hand.

ROCHFORD, a market-town of Essex, thirty-three miles east of London, and fifteen south-east of Chelmsford.

ROCHFORT, a port-town of Guienne, in France, twenty-three miles south of Rochelle: west long. 1°, north lat. 46°. It is one of the stations of the french navy, having a commodious harbour, well secured by forts and batteries.

ROCK, *rupes*, a large mass or block of hard stone rooted in the ground. See the article **STONE**.

Rock-alum. See the article **ALUM**.

Rock-crystal, otherwise called *ſprig-crystal*, in natural history, a name given to the third order of crystals, from their being affixed to a rock, or other solid body.

This kind of crystal is the most common of all others, and is what the generality of authors describe under the name of crystal of the shops, being that kept for medicinal purposes. See **CRYSTAL**.

The clearest, purest, and most transparent that can be had, ought to be chosen; and to prove its genuineness, it may be tried with aqua fortis, true crystal making no effervescence with that menstruum.

Rock-fish, a common english name for the *gobius marinus*, or sea gudgeon.

Rock-oil. See **PETROLEUM**.

Rock-salt. See the article **SALT**.

ROCKET, in pyrotechny, an artificial fire-work, consisting of a cylindrical case of paper, filled with a composition of certain combustible ingredients; which, being tied to a stick, mounts into the air, to a considerable height, and there bursts.

Rockets make a considerable part of all the works of entertainment; being not only used singly, but also as an ingredient in others.

The rock, above defined, is properly the *ſky rock*; the method of making which, is this. A concave cylindrical mould, A B (plate CCXXXIV. fig. 2. n° 1.) is turned of hard wood, with a base BD, and a capital HC, usually adorned

adorned with suitable mouldings. This cylinder must be open at both ends, and its dimensions, for rockets of various sizes, as in the following article. When large, it is sometimes also made of brass or tin; and when small, of bone. 2. Of the same matter with the cylinder, is prepared a quadra, or foot ME; in the middle of which is turned a hemisphere GO, considerably less than the cavity of the cylinder; making the cap or head of another cylinder IK, and reaching up within the case, where it is kept steady by a pin LM.

Authors do not agree about the proportions.—Simionowitz prescribes those that follow: if the diameter of the aperture HN be equal to that of a leaden ball of a pound, or at most two pounds weight; the height of the cylinder, with the base and capital HC, to be seven diameters, and the height of the quadra FE $1\frac{1}{3}$. The altitude of the cylinder KI, 1. The diameter HN, $\frac{1}{2}$. The diameter of the hemisphere G, $\frac{2}{3}$. The height of the capital AC, 1. The same author adds, that he finds by abundant experience, that, if the diameter of the aperture be divided into 100 parts, according to the different weight of the leaden balls, to whose diameter it is equal, the following numbers, being multiplied by 7, give the height HE.

Weight of leaden ball.	Subseptuple of altitude HE.
1	100
2	98
4	96
6	94
10	91
15	88
23	86
30	82
40	78
50	75
70	67
100	57

The mould being ready, a wooden cylinder or mould AB (*ibid.* n° 2.) is provided, whose diameter is $\frac{2}{3}$ of the aperture of the frame, and its length equal to the height of the same; to which is fixed a haft or hilt AD. About this mould is a thick strong paper, rolled, till such time as it fills the cavity of the frame. This done, where the haft is

joined to the cylinder, as at A, it is choaked, *i. e.* firmly bound round with fine pack-thread, so as to constrict or straiten the cavity thereof. The part thus choaked or bound up FG (*ibid.* n° 3.) to be equal to the hemisphere GO n° 1.

The case is now taken off the mould, and put into the cavity of the frame (n° 1.) the choak GF upon the hemisphere; and in this disposition is filled with a composition described in the following table, rammed strongly in by means of a wooden cylinder, or rammer fitting the cavity, and a mallet.

When filled, a paper-cap of a conical form is glued over the end of the case filled last; and the space left a-top filled with whole gunpowder, to the height of about one diameter; then the rocket bound, or choaked in E, as before in G. Lastly, the rocket is bored, as is represented in AL (n° 3.) care being taken to do it in the middle. Some, indeed, bore the rocket, as they fill it, by thrusting a long, sharp spike through the lower basis, and drawing it out again, when the rocket is full; but it is best not to bore till the rocket be used.

The boring is to go two thirds of the height of the rocket, abating one diameter of the cavity. The diameter of the bore in G is to be $\frac{1}{4}$ of the diameter of the cylinder; and in L $\frac{1}{5}$ of the lower diameter.

To make the rocket mount straight up, it is tied fast to the end of a long slender stick, MD (*ibid.* n° 3.) eight times as long as the rocket, in such manner, as that, when poised on the finger near the touch-hole F, the stick (which is usually made biggest at this end, and sloping gently to the other) may preponderate, though very little. The rocket, thus equipped, is hung at freedom, and lighted with port-fire.

Note, some, instead of a stick to make the rocket mount, furnish it with two wings, as MN (*ibid.* n° 5.) which have the same effect; and, instead of paper, some make the cases of wood covered with leather; others of a thin iron-plate. And some, instead of a wooden stick, use an iron-wire, with a plummet at the end of it.

The composition wherewith rockets are filled, consists of the following ingredients, *viz.* salt-petre, charcoal, and sulphur, all well ground; but the proportions of

these are various, for rockets of various sizes; as in the following table. Noting, that, in small rockets, gun-powder-dust is added.

Composition of ROCKETS of various sizes.

Weight of Rocket.	Salt-pet.	Sulphur.	Char-coal.	Gun-powder dust.
lb	lb	lb	lb	
100 or 60	30	10	20	
50	30	7	18	
20	18	12	26	
15	12	8	16	
10	9	9	20	
9	6	5	10	
5	4	8	16	
3	2	2	15	
1			6	3 ²
Ounces.	Oun.	Oun.	Oun.	Ounces.
9	4	1	2	9
6	12	1 $\frac{1}{2}$	4	15
3	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	12
1			2	15

Note, several rockets being disposed round the circumference of a wheel, whether circular or polygonous, the head of the one applied to the tail of another, and the wheel put in motion; as one rocket is spent, another will take fire; and the wheel be continued in its rotation.

As an additional ornament to rockets, it is usual to furnish them either with stars or with serpents, or sparks, which take fire when the rocket bursts: and sometimes little rockets are inclosed in great ones, to take fire when the large one is at its greatest height.

To make stars for ROCKETS. Mix three pounds of salt-petre with eleven ounces of sulphur, three ounces of beaten gun-powder, and ten of antimony. Moisten the mass with gum-water, and form them into little balls of the size of silberds; drying them well, either in the sun or an oven. When dry, inclose a number of them in the conical cap of the rocket.

Theory of the flight of sky ROCKETS. Mariotte takes the rise of rockets to be owing to the impulse or resistance of the air against the flame: Dr. Desaguliers accounts for it otherwise.

Conceive the rocket to have no vent at the choak, and to be set on fire in the conical bore; the consequence will be, either that the rocket would burst in the weakest place, or, if all its parts were

equally strong, and able to sustain the impulse of the flame, the rocket would burn out immoveable. Now, as the force of the flame is equable, suppose its action downwards, or that upwards, sufficient to lift forty pounds. As these forces are equal, but their directions contrary, they will destroy each other's action.

Imagine, then, the rocket opened at the choak; by this means the action of the flame downwards is taken away, and there remains a force equal to forty pounds acting upwards, to carry up the rocket, and the stick it is tied to. Accordingly, we find that if the composition of the rocket be very weak, so as not to give an impulse greater than the weight of the rocket and stick, it does not rise at all; or if the composition be slow, so that a small part of it only kindles at first, the rocket will not rise.

The stick serves to keep it perpendicular; for if the rocket should begin to stumble, moving round a point in the choak, as being the common center of gravity of rocket and stick, there would be so much friction against the air, by the stick between the center and the point, and the point would beat against the air with so much velocity, that the reaction of the medium would restore it to its perpendicularity.

When the composition is burnt out, and the impulse upwards is ceased, the common center of gravity is brought lower towards the middle of the stick; by which means the velocity of the point of the stick is decreased, and that of the point of the rocket increased; so that the whole will tumble down, with the rocket-end foremost.

All the while the rocket burns, the common center of gravity is shifting and getting downwards, and still the faster and the lower, as the stick is the lighter; so that it sometimes begins to tumble before it be burnt out; but when the stick is a little too heavy, the weight of the rocket bearing a less proportion to that of the stick, the common center of gravity will not get so low, but that the rocket will rise straight, tho' not so fast.

Method of making a water-ROCKET. Make a rocket after the usual manner, excepting the number of choaks. Let its diameter be equal to that of a leaden-ball, of two or three inches diameter, and let it be bored to a third part of its height. Inclose the rocket in a hollow paper cylinder,

linder, which smear over with melted pitch or wax, that it may resist the moisture.

Note, the weight of the rocket is to be so proportioned to that of the water, that the whole cylinder may be immersed. Some, instead of a cylinder, use a truncated cone, or even a spheroid; and some hang a weight to the end at which it is lighted.

ROCKINGHAM, a market-town of Northamptonshire, situated nineteen miles north of Northampton.

ROD, a wand, or long slender staff.

ROD is also used for a land measure of sixteen feet and a half: the same with perch and pole.

ROD, in gauging. See **GAUGING**.

Black-ROD, a staff carried by the king's gentleman-usher, as a badge of his office; this rod or staff is black, and has a lion in gold on its top. See **USHER**.

Fishing ROD, a long taper rod or wand, to which the line is fastened for angling.

Of these there are several sorts; as, 1. The troller, or trolling-rod, which has a ring at the end, for the line to go through, when it runs off a reel. 2. The whipper, or whipping-rod, which is weak in the middle, and top-heavy, but very slender. 3. The dopper, which is a strong rod, and very light. 4. The snapper, or snap-rod, which is a strong rod, peculiarly used for the pike. 5. The bottom-rod, which is the same as the dapper, only somewhat more pliable. 6. The snigging or proking stick, which is a forked stick, that has a short strong line baited with a lob-worm: this is only used for eels in their holes. See the article **ANGLING**, &c.

RODEZ, a city of France, in the province of Guienne: east long. $2^{\circ} 8'$, north lat. $44^{\circ} 20'$.

RODRIGO. See **CASTLE-RODRIGO**.

ROE, the spawn or seed of fish. That of the male fishes is usually distinguished by the name of soft roe, or milt, and that of the female, by hard-roë, or spawn.

So inconceivably numerous are these ovula, or small eggs, that M. Petit found 342144 of them in a carp of eighteen inches: but Mr. Leewenhoeck found in a carp no more than 211629. This last gentleman observes, that there are four times this number in a cod, and that a common one contains 9344000 eggs.

ROE is also one of the beasts of chase, of the deer kind. See the article **CERVUS**. The roe-buck is called, the first year, a

hind; the second, a gyrlë; the third, an henuë; the fourth, a roe-buck of the first head; and the fifth, a fair roe-buck.

ROELLA, in botany, a genus of the pentandria monogynia class of plants, with a monopetalous infundibuliform-flower, divided into five parts at the limb; the fruit is a cylindraceous capsule, shorter than the cup, composed of a single valve, and containing numerous angulated seeds; whence it is evidently distinct from the companula and polemonium.

ROER, the name of two rivers in Germany, one of which rises on the confines of Hesse, and falls into the Rhine, a little below Duysburg; the other rises in the dutchy of Juliers, and falls into the Maese at Roermond.

ROERMOND, a city of the United Netherlands, in the province of Gelderland: east longitude $5^{\circ} 35'$, north latitude $51^{\circ} 18'$.

ROGA, in antiquity, a present which the emperors made to the senators, magistrates, and even to the people; and the popes or patriarchs to their clergy.

These rogæ were distributed by the emperors on the first day of the year, on their birth-day, or on the natalis dies of the cities: and by the popes and patriarchs, in passion-week.

Roga is also used for the common pay of the soldiers.

ROGAROFF, a city of Poland, in the dutchy of Lithuania: east long. 30° , north lat. $52^{\circ} 45'$.

ROGATION, in the roman jurisprudence, a demand made by the consuls, or tribunes of the roman people, when a law was proposed to be passed. Rogatio is also used for the decree itself made in consequence of the peoples giving their assent to this demand, to distinguish it from a senatus consultum, or decree of the senate.

ROGATION-WEEK, the week immediately preceding Whitunday, so called from the three fasts therein on Monday, Tuesday, and Wednesday, which are also called rogations, or rogation-days, from the extraordinary prayers and supplications at this time offered to God by devout christians, to appease his anger and deprecate his judgments.

ROGUE, in law, an idle sturdy beggar; who by ancient statutes is for the first offence called a rogue of the first degree, and punished by whipping, and boring through the gristle of the right ear with a hot iron; and for the second offence,

is termed a rogue of the second degree, and if above eighteen years of age, ordered to be executed as a felon.

ROHAN, a town of France, in the province of Britany, situated twenty miles north of Vannes.

ROLDUC, a town of the Netherlands, in the dutchy of Limburg, five miles north of Aix-la-Chapelle.

ROLL, in manufactories, something wound and folded up in a cylindrical form.

Few stuffs are made up in rolls, except fattins, gawles, and crapes, which are apt to break, and take plaits not easy to be got out, if folded otherwise. Ribbons, laces, galloons, and paduas of all kinds, are also thus rolled.

A roll of tobacco is tobacco in the leaf, twisted on the mill, and wound twist over twist, about a stick or roller. A great deal of tobacco is sold in America in rolls of various weights; and it is not till its arrival in England, Spain, France and Holland, that it is cut. See the article **TOBACCO**.

A roll of parchment, properly denotes the quantity of sixty skins.

The antients made all their books up in the form of rolls, and in Cicero's time the libraries consisted wholly of such rolls. See the article *Form of Books*.

ROLL, in law, signifies a schedule or parchment which may be rolled up by the hand into the form of a pipe.

In these schedules of parchment all the pleadings, memorials, and acts of court, are entered and filed by the proper officer; which being done, they become records of the court. Of these there are in the exchequer several kinds, as the great wardrobe-roll, the cofferer's roll, the subsidy-roll, &c.

Roll is also used for a list of the names of persons of the same condition, or of those who have entered into the same engagement. Thus a court-roll of a manor, is that in which the names, rents, and services of each tenant are copied and inrolled.

Calves head **ROLL**, a roll in the two temples, in which every bench is taxed yearly at 2 s. every barrister at 1 s. 6 d. and every gentleman under the bar at 1 s. to the cook, and other officers of the house; in consideration of a dinner of calves-heads, provided in Easter-term.

Musty-**ROLL**, that in which are entered the soldiers of every troop, company, regiment, &c.

As soon as a soldier's name is written

down on the roll, it is death for him to desert.

ROLLS-OFFICE, is an office in Chancery-lane, London, appointed for the custody of the rolls and records in chancery. See the article *MASTER of the rolls*.

Rider-**ROLL**, a schedule of parchment frequently sewed or added to some part of a roll or record.

ROLLS of parliament, are the manuscript registers, or rolls of the proceedings of our antient parliaments, which before the invention of printing were all engrossed on parchment, and proclaimed openly in every county. In these rolls are also contained a great many decisions of difficult points of law, which were frequently in former times referred to the decision of that high court.

ROLL, in antiquity. See **ACACIA**.

ROLL, or **ROLLER**, is also a piece of wood, iron, brass, &c. of a cylindrical form, used in the construction of several machines, and in several works and manufactures.

Thus in the glass manufacture they have a running-roll, which is a thick cylinder of cast brass, which serves to conduct the melted glass to the end of the table on which large looking-glasses, &c. are cast. See the article **GLASS**.

Founders also use a roll to work the sand which they use in making their moulds. The presses called calenders, as serving to calender stuffs withal, consist, among other essential parts, of two rollers. It is also between two rollers that the waves are given to silks, mohairs, and other stuffs proper to be tabbled.

Impressions from copper plates are also taken by passing the plate and paper between two rollers. See the article *Rolling-press* **PRINTING**.

Rolls, in flattening-mills, &c. are two iron instruments of a cylindrical form, which serve to draw or stretch out plates of gold, silver, and other metals.

Rolls, in sugar-works, are two large iron barrels, which serve to bruise the canes, and to express the juice. These are cast hollow, and their cavities are filled up with wood, the cylinders of which are properly the rollers.

Rolls, among book-binders, are indeed of a different form; these being a kind of small brass-wheels with flowers, leaves, &c. cut on the edge: these wheels are fixed on an axis to which there is a handle, and being rolled when hot round the edges, &c. of the cover of a book,

a book, leave the impression of the flowers cut on the wheel, either plain or in gold. Rollers, among gardeners, are large stone, iron, or wooden cylinders fixed in a large handle, and drawn over walks, grass-plots, &c. to render them smooth and even.

Rolls, or rollers, among carpenters, masons, &c. are plain cylinders three or four feet long, used for the moving of beams, huge stones, &c. These are placed successively under the fore-part of the body to be removed, which is at the same time pushed forward by levers, &c. applied behind. For moving loads excessively heavy, the masons, &c. have what they call endless rollers, which are about double the length and thickness of the common rollers, and besides are girt with several large iron-hoops at each end: at a foot distance from the ends are four mortises, or rather only two, but pierced through, into which are put the ends of long levers, which the workmen draw by long ropes fastened to the ends, still changing the mortise as the roll has made a quarter of a turn. See LEVER.

ROLLER, in surgery, a long and broad bandage usually of linen-cloth, rolled round any part of the body, to keep it in, or dispose it to a state of health. See the article BANDAGE.

ROLLER, in ornithology, the grey ampelis, with the head variegated with black. See the article AMPELIS.

ROLLER is also the name of a species of the corvus, with a blood-red back, a green tail, and black wings. See the article CORVUS.

ROLLING PRESS *printing*. See the article PRINTING.

ROMAN, in general, something belonging to the city of Rome. See ROME.

For the roman senate, emperors, consuls, prætors, quæstors, ædiles, games, &c. see SENATE, EMPEROR, &c.

The term roman purple, is at present used to denote the dignity of a cardinal. See the article CARDINAL.

The roman catholics are those christians who follow the doctrines and discipline of the church of Rome; the substance of which may be seen in pope Pius's creed, and has been treated of in the course of this work, under the articles TRANSUBSTANTIATION, MARRIAGE, CELIBACY, BAPTISM, SACRAMENT, MONK, MASS, HOST, IMAGE, RELICS, PURGATORY, &c. &c.

King of the ROMANS, in modern history, is

a prince elected to be successor to the reigning emperor of Germany. See the articles EMPEROR, ELECTOR, &c.

ROMAN ORDER, in architecture, the same with the composite order. See the articles ORDER and COMPOSITE.

As to the roman balance, indiction, year, language, citizens, &c. see the articles BALANCE, INDICTION, &c.

Epistle to the ROMANS, or *St. Paul's Epistle to the ROMANS*. See EPISTLE.

ROMANCE, in matters of literature, a fabulous relation of certain adventures designed for the entertainment and instruction of the readers. See FABLE.

The true nature and genuine characteristics of this species of writing are excellently explained by the ingenious author of the Rambler; who observes, that the works of fiction, with which the present generation seems more particularly delighted, are such as exhibit life in its true state, diversified only by the accidents that daily happen in the world, and influenced by those passions and qualities which are really to be found in conversing with mankind.

This kind of writing may be termed not improperly the comedy of romance, and is to be connected nearly by the rules of comic poetry. Its province is to bring about natural events by easy means, and to keep up curiosity without the help of wonder: it is therefore precluded from the machines and expedients of the heroic romance, and can neither employ giants to snatch away a lady from the nuptial rites, nor knights to bring her back from captivity; it can neither bewilder its personages in desarts, nor lodge them in imaginary castles.

Scaliger, upon Pontanus, remarks, that all his writings are filled with images, and that if you take from him his lilies and his roses, his satyrs and his dryads, he will have nothing left that can be called poetry. In like manner, almost all the fictions of the last age will vanish, if you deprive them of a hermit and a wood, a battle and a shipwreck.

Why this wild strain of imagination found reception so long, in polite and learned ages, it is not easy to conceive; but we cannot wonder, that, while readers could be procured, the authors were willing to continue it; for when a man had, by practice, gained some fluency of language, he had no farther care than to retire to his closet, to let loose his invention, and heat his mind with incredible.

ibilities; and a book was produced without fear of criticism, without the toil of study, without knowledge of nature, or acquaintance with life.

The task of our present writers is very different; it requires, together with that learning which is to be gained from books, that experience which can never be attained by solitary diligence, but must arise from general converse, and accurate observation of the living world. Their performances have, as Horace expresses it, *plus oneris quantum veniæ minus*, little indulgence, and therefore more difficulty. They are engaged in portraits of which every one knows the original, and can therefore detect any deviation from exactness of resemblance. Other writings are safe, except from the malice of learning, but these are in danger from every common reader; as the slipper was censured by a shoemaker, who happened to stop in his way at the Venus of Apelles.

But the danger of not being approved as just copiers of human manners is not the most important apprehension that an author of this sort ought to have before him. These books are written chiefly to the young, the ignorant, and the idle, to whom they serve as lectures of conduct, and introductions into life. They are the entertainment of minds unfurnished with ideas, and therefore easily susceptible of impressions; not fixed by principles, and therefore easily following the current of fancy; not informed by experience, and consequently open to every false suggestion and partial account.

That the highest degree of reverence should be paid to youth, and that nothing indecent or unseemly should be suffered to approach their eyes or ears, are precepts extorted by sense and virtue from an antient writer, by no means eminent for chastity of thought. The same kind, though not the same degree of caution, is required in every thing which is laid before them, to secure them from unjust prejudices, perverse opinions, and improper combinations of images.

In the romances formerly written, every transaction and sentiment was so remote from all that passes among men, that the reader was in very little danger of making any applications to himself; the virtues and crimes were equally beyond his sphere of activity; and he amused himself with heroes, and with traitors, deliverers and persecutors, as with beings

of another species, whose actions were regulated upon motives of their own, and who had neither faults nor excellencies in common with himself.

But when an adventurer is levelled with the rest of the world, and acts in such scenes of the universal drama, as may be the lot of any other man, young spectators fix their eyes upon him with close attention, and hope, by observing his behaviour and success, to regulate their own practices, when they shall be engaged in the like part.

For this reason, these familiar histories may perhaps be made of greater use than the solemnities of professed morality, and convey the knowledge of vice and virtue with more accuracy, than axioms and definitions. But if the power of example is so great, as to take possession of the memory by a kind of violence, and produce effects almost without the intervention of the will, care ought to be taken that, when the choice is unrestrained the best examples only should be exhibited; and that which is likely to operate so strongly should not be mischievous or uncertain in its effects.

The chief advantages which these fictions have over real life, is, that their authors are at liberty, though not to invent, yet to select objects, and to cull from the mass of mankind, those individuals upon which the attention ought most to be employed; as a diamond, though it cannot be made, may be polished by art, and placed in such a situation, as to display that lustre which before was buried among common stones.

ROMANIA, a province of the pope's territories in Italy, including the Bolognese and Ferrarese. See the articles **BOLOGNA** and **FERRARA**.

ROMANIA is also the modern name of antient Thrace, which now makes a province of Turkey in Europe; lying westward of the Propontis, between the Euxine sea and the Archipelago.

ROMANS, or **ROMANT**, an appellation formerly given to the polite french language, in opposition to the waloon.

ROMANS is also a town of Dauphine, in France, situated on the river Isère, fifteen miles south-west of Grenoble.

ROME, *Roma*, the capital of the pope's territories and of Italy, and antiently the mistress of the roman Empire: east long. 13°, north lat. 41° 45'.

Rome is still a large and fine city, though not to be compared to antient Rome; the

the streets are spacious and magnificently built; it has five bridges over the Tiber, twenty gates, three hundred churches, and a vast number of palaces, convents, triumphal arches, pillars, obelisks, statues, theatres, &c.

ROMNEY, a borough town of Kent, and one of the cinque ports, situated twelve miles south-west of Dover.

It sends two members to parliament.

ROMPEE, or **ROMPU**, in heraldry, is applied to ordinaries that are represented as broken, and to chevrons, bends, or the like, whose upper points are cut off. See plate CCXXXIII. fig. 3.

RONCIGLIONE, a town of Italy, in the pope's territories, and in St. Peter's patrimony, 25 miles north of Rome.

RONDA, a town of Spain, in the province of Granada, twenty-two miles north of Gibraltar.

RONDEL, in fortification, a round tower, sometimes erected at the foot of a bastion.

RONDELETIA, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of a single petal of the infundibuliform-kind; the tube is cylindric and longer than the cup, and ventricose at the top; the limb is divided into five roundish segments, which bend backward: the fruit is a roundish coronated capsule, containing two cells; the seeds are numerous and small.

ROOD, a quantity of land equal to forty square perches, or the fourth part of an acre.

ROOF, in architecture, the uppermost part of a building.

The roof contains the timber-work, and its covering of slate, tile, lead, &c. tho' carpenters usually restrain the word to the timber-work only.

The form of roofs is various: sometimes it is pointed, in which case the most beautiful proportion is to have its profile an equilateral triangle: sometimes it is square, that is, the pitch or angle of the ridge is a right angle, which therefore is a mean proportion, between the pointed and flat roof, which last is in the same proportion as a triangular pediment: this is chiefly used in Italy, and the hot countries where there is but little snow. Sometimes roofs are made in the pinnaciform: sometimes they have a double ridge, and sometimes they are mutilated, that is, consist of a true and a false roof, which is laid over the former: sometimes again they are in the form of a platform, as most of the eastern buildings are; and

sometimes they are truncated, that is, instead of terminating in a ridge, the roof is cut square off at a certain height, covered with a terrace, and encompassed with a ballustrade; and sometimes, again, a roof is made in the manner of a dome. When the walls have been raised to their designed height, the vaults made, the joists laid, the stairs, &c. brought up, then the roof is to be raised, which embracing every part of the building, and with its weight equally pressing upon the walls, is a band to all the work; and besides, defends the inhabitants from rain or snow, the burning heat of the sun, and the moisture of the night, and is of no small advantage to the building, in casting off the rain water from the walls. See the article **GUTTERS**.

ROOF-TREES, or **RUFF-TREES**, in a ship, are small timbers which go from the half-deck to the fore-castle, and serve to bear up the gratings.

This term is also used for the upper timbers in any building.

Hip-ROOF. See the article **HIP-ROOF**.

ROOK, in ornithology, a species of the wholly black corvus. See **CORVUS**.

ROOM, a chamber, parlour, or other apartment in a house. See **BUILDING**.

Rooms are either made with a vaulted or flat ceiling. If with a flat ceiling, Palladio says, that the height from the floor to the ceiling must be equal to their breadth; and the rooms above must be a sixth part less in height than those below: but if they are vaulted, the height of the vaults in rooms that are square, is a third part more than its breadth.

With regard to the compartment and disposition of rooms, he says, that the halls and magnificent rooms ought to be light and easy of ascent; and that the small rooms may be divided off to make closets. That the rooms for summer ought to be spacious and turned to the north; and those for the winter to the south and west, and rather small than otherwise: because we seek the shade in summer, and in winter the sun; besides small rooms are more easily warmed than large. But the large rooms with the middling, and those with the small, ought to be so distributed that one part of the fabric may correspond with the other, and that the body of the edifice may have in itself a certain convenience in its members, which may render the whole beautiful and graceful.

ROOMS, in a ship, are places divided by partitions

partitions or bulk-heads. See the articles GUN-ROOM, COOK-ROOM, &c.

ROOMER, in the sea-language; a ship is said to be a roomer when she is larger than ordinary.

ROOT, *radix*, among botanists, denotes that part of a plant which imbibes the nutritious juices of the earth, and transmits them to the other parts. See the articles PLANT and VEGETATION.

The roots of plants are distinguished, according to their different forms, into bulböse, fibrose, granulose, grumole, tuberose, and tap-roots. See BULBOSE, &c. As to the gathering and preserving roots for medicinal uses, the Edinburgh-dispensatory directs, that the annual roots be taken up before they shoot out stems or flowers; the biennial ones, for the most part, in the autumn of the first year; and the perennial ones when the leaves begin to fall, and therefore generally in autumn: then being cleansed by washing, and freed from the withered and decayed fibres, they are to be hung in a shady place pervious to the air, till they are moderately dry: the thicker roots should be slit lengthwise; or they may be cut transversely into thin pieces, and the pith taken out. These roots, which are very numerous, have been treated of under their several articles RHUBARB, JALAP, HELLEBORE, &c. &c.

ROOT-GRAFTING, in gardening. See the article GRAFTING.

ROOT, in mathematics, a quantity considered as the basis or foundation of a higher power; or one which being multiplied into itself any number of times, produces a square, cubic, biquadratic, &c. quantity; called the second, third, fourth, &c. power of the root, or quantity, so multiplied into itself: thus a is the square root of $a \times a$, or a^2 ; and 4 the square root of $4 \times 4 = 16$. Again, a is the cube root of $a \times a \times a = a^3$; and 3 the cube-root of $3 \times 3 \times 3 = 27$; and so on. See the articles INVOLUTION, POWER, and EXTRACTION of roots.

The roots of powers are expressed by placing the radical sign $\sqrt{\quad}$ over them, with a number denoting what kind of root they are: thus the square or second root of 16 is expressed by $\sqrt{16}$, and the cube or third root of 27 by $\sqrt[3]{27}$; and, in general, the n th root of a raised to the power m , is expressed by $\sqrt[n]{a^m}$. When the root of a compound quantity is wanted, the vinculum of the radical sign must be

drawn over the whole: thus the square root of $a^2 + 2ab + b^2$ is expressed by $\sqrt{a^2 + 2ab + b^2}$; and it ought to be observed, that when the radical sign has no number above it, to denote what root is wanted, the square root is always meant; as $\sqrt{a^2}$, or $\sqrt{16}$, is the square root of a^2 , or the square root of 16.

ROOTS, *radices*, in grammar, are the primitive words of a language, whence the others are formed or derived. See the articles WORD and LANGUAGE.

ROPE, hemp, hair, &c. spun out into a thick yarn, and then several strings of this yarn twisted together by means of a wheel. When made very small it is called a cord, and when very thick, a cable. See CORD and CABLE.

Dr. Desaguliers, in the first volume of his Experimental Philosophy, has computed the forces necessary to bend ropes of different diameters, stretched by different weights, round rollers of different bignesses, to be as in the following table.

Resistance about a roller of one inch diameter in oz. avoirdupois.	Resistance about a roller of half an inch diameter, in oz. avoirdupois.	Weights stretching the ropes, expressed in lb. avoirdupois.	Diameters of the ropes of three strands, expressed in tenths parts of an inch.
75 oz	112½ oz.	22½ oz.	0.5
30	45	90	0.2
15	22½	45	0.1
50	75	150	0.5
20	30	60	0.2
10	15	30	0.1
25	37½	75	0.5
10	15	30	0.2
*	7½	15	0.1

On the whole, it is found by experiments, that the difficulty of bending a rope round a roller decreases directly as the diameter of the roller increases; or is, inversely, as the diameter of the roller. Ropes are made for various uses, as for binding, staving, drawing, suspending, &c.

The greatest consumption of ropes is in navigation, for the tackling of ships: where, though ropes include the whole cordage, there are several particularly so denominated, and which have particular names given to them: these are, 1. Aun-

ing-

ing-ropes, which are for spreading the awnings. 2. Bell-ropes, which are made fast to the crank for striking it. 3. Boat-rope, that by which the boat at the stern is towed. 4. Bolt-ropes, the head and body ropes stowed round the sails. 5. Breast-rope, that made fast to the shrouds in the chains, to support the man that heaves the lead. 6. Bucket-rope, that which is tied to the bucket, for hauling up water. 7. Buoy-rope, that which is tied to the buoy by one end, and to the stock of the anchor by the other. 8. Can-hook-ropes, which are seized to each hook, to hoist hogheads, &c. on board. 9. Cat-rope, that used for hoisting up the anchor in order to be stowed at the bow. 10. Davit-rope, is reeved through a hole made at each end, for hauling the davit to either side of the fore-castle. 11. Enting-rope, to take hold of, in going up the ship's side. 12. Luff-hook-rope, is for bousing the tack-aboard, when it blows hard, and is a sort of preventer to the tack. 13. Grapple-rope, that which being bent to a grapple, either the long-boat, pinnace, or yawl rides by it. 14. Guefs-rope, is for keeping the long-boat, pinnace, or yawl from steering, or going too much in and out when towing. 15. Parrel-rope is reeved through the ribs and trucks, and, with the breast-ropes, lashes the parrel to the masts. 16. Rudder-rope, that reeved through a hole in the boat's rudder. 17. Slip-rope is for triseing up the bites of the cable to the rails of the head. 18. Stantion-ropes, those reeved through the eyes of the stantions. 19. Swabb-rope serves as a handle to the eyes of the stantions. 20. Top-ropes are those with which the top-masts are set or struck; they are reeved through an iron-bound block, which hooks under the cap, and then reeved through the heel of the top-mast; the other part of them comes down to the top-tackle-falls, which has double blocks iron-bound, and hooks to ring bolts upon the deck. 21. Tiller-ropes, are to keep the tiller steady, that it may not fly from side to side. 22. Waist-ropes, for boats to make fast to, along side. 23. Wheel-rope, that which goes round the spindle of the steering-wheel, and from thence to the titter.

ROPE-YARN, among sailors, is the yarn of any rope untwisted, but commonly made up of junk; its use is to make sinnet, mats, &c.

ROS, DEW. See the article **DEW**.

ROSA, the **ROSE**, in botany. See **ROSE**. **ROSACEOUS**, among botanists, an appellation given to such flowers, as are composed of several petals or leaves, disposed in a sort of circular form, like those of the rose: such are the flowers of the piony, crowfoot, cinquefoil, &c. In this sort of flowers the disposition only of the leaves is regarded, their number being of no consequence. It is very seldom that the number is two or four, except in the circæa and onagra. The most frequent number of leaves in these flowers is five, and such as have four differ from the cruciform flowers, not only in their disposition, but in this, that the number is in the same species indeterminately, four, five, or six, as is the case in the clematis, the capers, and the species of rue, whereas in the cruciform ones it is ever constant. See the article **BOTANY**.

ROSARY, among the roman-catholics, the same with chaplet. See **CHAPLET**. Before a person repeats his rosary, he must cross himself with it; he must then repeat the apostles' creed, and say a pater-noster, and three aves, on account of the three relations which the virgin bears to the three persons in the trinity; after which he passes on to his decads.

Rosary also denotes a particular form of devotion addressed to the virgin, to which the chaplet of that name is accommodated.

ROSCOMMON, a county of Ireland, bounded by Letrim on the north, and Galway on the south.

ROSE, *rosa*, in botany, a genus of the icosaandria-polygynia class of plants, the flower of which is composed of five petals, obversely cordated, and arranged in a circular form: the fruit is formed of the fleshy base of the cup, which is of a turbinated figure, coloured, soft, containing only one cell drawn together at the neck, and coronated with some irregular lacinix; the seeds are numerous, oblong and hairy. See plate CCXXXIV. fig. 3.

The wild briar, with beautiful pinnated leaves, a white or pale red flower, and the common hip for its fruit, is that above described: and, indeed, all the beautiful roses in our gardens, are only varieties of this species, principally owing to culture; the red, the damask, the white, the variegated, &c. roses, being all produced from this original species.

The flowers of the red rose are astringent,

gent, those of the damask-rose purgative, and the fruit of the wild rose pectoral. The rose-water of the shops, distilled from the flowers of the damask-rose, has been celebrated for many virtues; but its fragrant smell is the only quality now regarded in it. There is also a syrup, made either from the juice, or infusion of the fresh flowers of damask-roses.

ROSE, in architecture, an ornament cut in the form of a rose, chiefly used in corniches, frizes, vaults of churches, &c. and particularly in the middle of each face in the corinthian abacus.

ROSE-NOBLE, an antient english gold-coin, first struck in the reign of Edward III. It was formerly current at 6 s. 8 d. and so called because stamped with a rose.

ROSE-WOOD, *rhodium*, or *aspalathus*, in the materia medica. See **ASPALATHUS**.

ROSEBRUGGE, a town of Flanders, eleven miles north-west of Ypres.

ROSEMARY, *rosmarinus*, in botany, a genus of the diandria-monogynia class of plants, with a ringent monopetalous flower, whereof the upper lip is bifid and erect, and the under lip trifid and reflex; there is no pericarpium, the cup holding the four seeds in its bottom.

Rosemary has at all times been a favourite shrub in medicine: it is full of volatile parts, as appears by its taste, smell, and analysis. It is a very valuable cephalic, and is good in all disorders of the nerves, and in hysteric and hypochondriac cases. It is good in palsies, apoplexies, epilepsies, and vertigos. It strengthens the sight, and sweetens the breath. It is greatly commended by some against obstructions of the viscera, particularly of the liver and spleen; and in the jaundice. The flowers have the credit of being great cordials; and some imagine they even possess the virtues of the whole plant in a more exalted degree than any other part. However, the flowery tops, leaves, and husks, together with the leaves themselves, are much fitter for all purposes, than the flowers alone.

ROSICRUCIANS, or **ROSYCRUCIANS**. See the article **ROSYCRUCIANS**.

ROSIENNE, a town of Samogitia, in Poland: east longitude $23^{\circ} 30'$, north latitude $55^{\circ} 50'$.

ROSIN, or **RESIN**. See the article **RESIN**.
ROSMARINUS, **ROSEMARY**, in botany. See the article **ROSEMARY**.

ROSS, county of Scotland, bounded by Sutherland on the north, by the German sea and the Murray frith on the east

and south, and by Inverness-shire and the western ocean on the south and west.

ROSS is also a market-town, situated on the river Wye, eleven miles south of Hereford.

ROSSANO, a city and port-town of Calabria, in the kingdom of Naples, eighty miles south-west of Taranto.

ROSSE, a port-town of Ireland, twenty-two miles west of Kinsale.

ROS-SOLIS, **SUN-DEW**, an agreeable spirituous liquor, composed of burnt brandy, sugar, cinnamon, and milk-water; and sometimes perfumed with a little musk: it is so called, as being at first prepared wholly of the juice of the plant *ros-folis*, or *drosera*. See the article **DROSER**.

ROSTING, or **ROASTING**. See the article **ROASTING**.

ROSTOCK, an imperial city of lower Saxony, situated on a bay of the Baltic sea: east longitude $12^{\circ} 15'$, and north latitude $54^{\circ} 20'$.

ROSTOF, or **ROSTOVA**, the capital of a territory of the same name, in Russia: east longitude 40° , and north latitude $57^{\circ} 20'$.

ROSTRA, in antiquity, a part of the roman forum, wherein orations, pleadings, funeral harangues, &c. were delivered.

ROSTRI-FORMIS PROCESSUS, in anatomy. See the article **CORACOIDES**.

ROSTRUM literally denotes the beak or bill of a bird; and hence it has been figuratively applied to the beak, or head of a ship.

ROSTRUM, in chemistry, implies the nose or beak of the common alembic, which conveys the liquor distilled into its receiver. See the article **ALEMBIC**.

ROSYCRUCIANS, **ROSICRUCIANS**, or *brothers of the rosy cross*, a name assumed by a sect or cabal of hermetical philosophers, who appeared, or at least were first taken notice of, in Germany, in the beginning of the XVIth century. They pretended to be masters of all sciences, and to have many important secrets, particularly that of the philosopher's stone. See the article **PHILOSOPHER**.

Their society is frequently denoted by the abbreviations **F. R. C.**

ROT, a disease incident to sheep, arising from wet seasons, and too moist pasture. It is a very hard thing to prevent the rot, if the year prove very wet, especially in May and June. Salt-marshes, and lands where broom grows, are the best places of preservation for them. Sheep are sometimes all cleared of the rot, when not too

too far gone with it, only by removing them into broom-fields. Scurvy-grass, mustard, parsley, and thyme are also good for the prevention of it.

Some propose the giving sheep half a handful of bay-salt, every month or oftener; and there is great probability that this may be of service: but the rational way of attacking all disorders in cattle, is by considering what are the causes of them. It will appear, upon enquiry, that wet seasons are the general occasions of the rot in sheep, and therefore it would be advisable for the owners, when such seasons come on, to remove those animals into the driest pastures they can, and then to feed them principally with dry sweet hay, oats, bran, and the like; this would prevent the occasion: and if they were already a little infected, some salt given with their dry food, would be a happy means of curing them.

OTA, WHEEL, in mechanics. See the article WHEEL.

There is a celebrated problem in mechanics, called *rota aristotelica*, Aristotle's wheel, because that philosopher is the first who took notice of it. The matter to be accounted for, is how a point in the nave of a wheel comes to describe, during one revolution, a line equal to the length of the outer circumference of the wheel, when a point in the outer circumference does no more.

Many great men having attempted in vain to account for this phenomenon, Mr. de Meyran, a french gentleman, had the good fortune to light on a solution of it, which the Academy of Sciences declared to be satisfactory. It is this: a wheel is only acted on, or drawn forward, in a right line: its circular motion, or rotation, arising purely from the resistance of the ground whereon it is applied. Now this resistance is equal to the force where-with the wheel is drawn in the right line, inasmuch as it defeats that direction; and, consequently, the causes of the two motions being equal, their effects are equal too; or, a point in the wheel describes, during one revolution, a right line on the ground equal to its outer circumference.

But as to the nave of the wheel, the case is otherwise; for though it is drawn in a right line by the same force as the outer circumference, yet it only turns round because the wheel turns, and can only turn with it, and in the same time. Hence it follows, that its circular velocity

is less than that of the circumference of the wheel, in the ratio of the two circumferences; and therefore, of course, its circular motion is less than its rectilinear one. Since then it necessarily describes a right line equal to that described by the circumference of the wheel, it can only do it by sliding along.

ROTA is also the name of an ecclesiastical court at Rome, composed of twelve prelates, whereof one must be a German, another a Frenchman, and two Spaniards; the other eight are Italians, three of whom must be Romans, and the other five a Bolognese, a Ferraran, a Milanese, a Venetian, and a Tuscan.

This is one of the most august tribunals in Rome, which takes cognizance of all suits in the territory of the church, by appeal; as also of all matters beneficiary and patrimonial.

ROTATION, in geometry, a term chiefly applied to the circunvolution of any surface round a fixed and immoveable line, which is called the axis of its rotation: and by such rotations it is, that solids are conceived to be generated. See the article GENESIS.

The late ingenious Mr. de Moivre shews how solids, thus generated, may be measured or cubed. His method is this: for the fluxion of such solids, take the product of the fluxion of the absciss, multiplied by the circular base; and suppose the ratio of a square to the circle inscribed

in it to be $\frac{\pi}{4}$; then the equation ex-

pressing the nature of any circle, whose diameter is d , is $y^2 = dx - xx$. There-

fore $\frac{4dx^2 - x^2x}{\pi}$ is the fluxion of a por-

tion of the sphere; and, consequently,

the portion itself $4\frac{1}{2}dxx - x\frac{1}{2}x^3$, and

the circumscribed cylinder is $\frac{4dxx - x^3}{\pi}$;

and therefore the portion of the sphere is to the portion of the circumscribed cylinder, as $\frac{1}{2}d - \frac{1}{4}x$ to $d - x$.

ROTATION, or REVOLUTION, in astronomy. See the article REVOLUTION.

ROTATOIRES, in anatomy, the name by which some call the oblique muscles of the eye. See EYE and OBLIQUES.

ROTATOIRES is also applied to the trochanters of the thigh-bone. See the article FEMUR and TROCHANTER.

ROTEBURG, a town of Franconia, in Germany: east long. $10^{\circ} 5'$, north lat. $49^{\circ} 20'$.

ROTEBURG is also a town of Lower Saxony, in the dutchy of Verden, twenty-four miles east of Bremen.

ROTHER, or **RUDDER**. See **RUDDER**.

ROTHERAM, a market-town of Yorkshire, 35 miles south-west of York.

ROTHSAY, a parliament-town of Scotland, in the isle of Bute: west longitude 5° , and north latitude $55^{\circ} 50'$.

ROTING, a town of Franconia, in Germany: east long. $9^{\circ} 50'$, and north lat. $49^{\circ} 30'$.

ROTONDO, or **ROTUNDO**, in architecture, an appellation given to any building that is round both within and without side, whether it be a church, a salon, or the like. The most celebrated *rotondo* of the antients, is the pantheon at Rome. See the article **PANTHEON**.

ROTTENNESS, or **PUTREFACTION**. See the article **PUTREFACTION**.

ROTTERDAM, a city of the province of Holland, situated on the north bank of the Maese, thirty miles south of Amsterdam, and thirteen miles south-east of the Hague: east longitude $4^{\circ} 20'$, and north latitude 52° .

ROTULA, in anatomy, the same with the *patella*. See the article **PATELLA**.

ROTULORUM CUSTOS. See the article **CUSTOS ROTULORUM**.

ROTULUS, a **ROLL**. See **ROLL**.

ROTUNDO, or **ROTONDO**. See the article **ROTUNDO**.

ROTUNDUS, in anatomy, a name given to several muscles, otherwise called *teres*. See the articles **TERES** and **MUSCLE**.

Pronator **ROTUNDUS**. See **PRONATORS**.

ROTWEIL, a town of Swabia, in Germany, situated on the river Neckar: east long. $8^{\circ} 30'$, and north lat. $48^{\circ} 8'$.

ROUEN, a city of France, and capital of Normandy, situated on the north side of the Seyne, sixty-five miles north of Paris, and forty five miles south-east of Havre de Grace and the British Channel: east long. $1^{\circ} 6'$, north lat. $49^{\circ} 30'$.

ROVEREDO, a city of the bishopric of Trent, eight miles south of Trent.

ROVERGNE, a division of Guienne, in France.

ROUGE-CROSS. See **POURSUIVANT**.

ROUGHNESS, in mechanics. See the articles **FRICTION** and **RESISTANCE**.

ROVIGO, the capital of the Polefin de Rovigo, in Italy, subject to Venice: east long. $12^{\circ} 25'$, north lat. $45^{\circ} 6'$.

ROUND, *rotundus*, in geometry. See the articles **CIRCLE**, **GLOBE**, and **SPHERE**. The Italian musicians give the name of

b round, to what we call a flat *b*. the article **FLATS**.

ROUND, in a military sense, signifies a way which some officer, attended with a party of soldiers, takes in a fortified place around the ramparts, in the night-time in order to see that the sentries are watchful, and every thing in good order. The sentries are to challenge the round at a distance, and rest their arms as they pass, to let none come near them; and when the round comes near the guard the centry calls aloud, *who comes there*; and being answered, *the rounds*; he then stands; and then calls the corporal of the guard, who draws his sword, and calls also, *who comes there*; and when he is answered, *the rounds*, he who has the sword advances, and the corporal receives it with his sword pointed to the giver's breast. In strict garrison the rounds are every quarter of an hour.

Way of the ROUNDS. See **WAY**.

Counter-ROUNDS. See **COUNTER**.

ROUND-HOUSE, a kind of prison, for the nightly watch in London to secure disorderly persons; till they can be carried before a magistrate.

ROUND HOUSE, in a ship, the uppermost room, or cabin, on the stern of a ship, where the master lies.

To ROUND a horse, in horsemanship, a general term for all sorts of maneges upon a volt, or circular tread. See the article **VOLT**.

ROUNDELAY, a kind of antient poem thus termed, according to Menage, from its form, because it turns back again to the first verse, and thus goes round. The poem is little known among us, but very common among the French, who call it *rondeau*. It consists commonly of thirteen verses, eight whereof are in one rhyme, and five in another. It is divided into couplets, at the end of the second and third whereof the beginning of the roundelay is repeated, and that is possible in an equivocal or pausing sense.

ROUNDELET. See **RUNDELET**.

ROUND, **ROUNDELAY**, in music, a kind of burden or ritornello, where the beginning of each couplet is repeated at the end thereof.

ROUSE, among falconers, is when a hawk lifts up and shakes herself.

ROUSE a barrow, or *cable*, in the sea-language, signifies to haul in part of the hawser or cable, which lies slack in the water.

ROUSELAER, a town of the Netherlands

in the province of Flanders, situated eleven miles north-east of Ypres.

OUSILLON, formerly a province of Spain, now united to France, is bounded by Languedoc on the north, by the Mediterranean sea on the east, by Catalonia on the south, and by the Pyrenean mountains on the west, being about fifty-five miles long, and thirty-six broad.

OUSSIN, in the manege, is a strong, well-knit, and stowed horse, such as are brought into France from Germany and Holland.

OUT, a public road, highway, or course, especially that which military forces take. This word is also used for the defeat and flight of an army.

OUT, in law, is applied to an assembly of persons, going forcibly to commit some unlawful act, whether they execute it or not.

The difference between a rout and a riot seems to be this, that a rout is where persons are unlawfully assembled, and have moved forwards, in order to commit the unlawful act intended, but part without doing it: whereas riot is taken for the disorderly fact committed by any such unlawful assembly. Two things, however are common both to riot and rout, as also unlawful assembly; the one is, that three persons at least be gathered together: the other is, that, being gathered together, they disturb the peace either by words, shew of arms, turbulent gesture, or actual violence. See **RIOT**.

OWEL, among farriers, a kind of issue, made by drawing a skain of silk, thread, hair, or the like, through the nape of the neck, or the other part, of a horse; answering to what, in surgery, is called a seton. See the article **SETON**.

The rowelling of horses is a method of cure frequently had recourse to, in cases of inward strains, especially about the shoulders or hips, as also for hard swellings not easy to be dissolved. The operation is this: a little slit being made through the skin, about an handbreadth below the part aggrieved, big enough to put a swan's quill in; the skin is raised from the flesh, the end of the quill put in, and the skin blowed from the flesh upwards, and all over the shoulder; then the hole being stopped with the finger, the part blown is beat with an hazel-stick, and the wind spread with the hand all over, and then let go; this done, a skain of horse-hair, or red tinsenet, half the thickness of the little finger, is put in

a rowelling needle, seven or eight inches long, and the needle is put into the hole, and drawn through again, six or seven inches higher; then the needle is drawn out, and the two ends of the rowel tied together, anointing it every day, as well as before the putting it in, with sweet butter and hog's grease, and drawing it backwards and forwards in the skin, to make the putrid matter discharge itself more plentifully.

Others, disliking these rowels, as making too large a sore and scar, use the french rowel, which is a round piece of stiff leather, with a hole in the midst, laying it flat between the flesh and skin, the hole in the rowel just against that in the skin, sewing it with a needle and thread drawn through the hole and the skin, cleaning it once in two or three days, and then anointing it afresh.

ROWELS of a spur. See **SPUR**.

ROWS of trees. See **PARALLELISM**.

ROXBURGH, the name of a county in Scotland, which sends one member to parliament.

ROXENT CAPE, or **ROCK of Lisbon**, a mountain and remarkable promontory in Portugal, situated in the Atlantic ocean, at the north entrance of the river Tagus, twenty-two miles north of Lisbon.

ROYAL, or **REGAL**, something belonging to a king: thus we say, royal family, royal assent, royal exchange, &c. See the articles **FAMILY**, **ASSENT**, &c.

ROYAL EXCHANGE, the burse or meeting-place of the merchants in London. See the article **EXCHANGE**.

It was built in 1566, at the charge of Sir Thomas Gresham, and in a solemn manner, by herald with sound of trumpet, in presence of queen Elizabeth, proclaimed the royal exchange. Till that time the merchants met in Lombard-street. It was built of brick, yet then esteemed the most splendid burse in Europe. An hundred years after its building, at the great fire, it was burnt down; but soon raised again in a still more magnificent manner, the expence thereof amounting to £. 50,000. One half of this sum was disbursed by the chamber of London, the other by the company of mercers, who, to reimburse themselves, let to hire 190 shops above stairs, at £. 20 each, which, with other shops, &c. on the ground, yield a yearly rent of above £. 4,000; yet the ground it stands on does not exceed three-fourths of an acre, whence it is observed to be much the richest

richest spot of ground in the world. It is built quadrangular, with walks around, wherein the merchants of the respective countries associate themselves. In the middle of the area or court is a fine marble statue of king Charles II. in the habit of a roman Cæsar, erected by the society of merchant-adventurers. Around are the statues of the several kings since the Norman conquest, ranged.

ROYAL-oak, a fair spreading tree at Boscobel, in the parish of Donnington in Staffordshire, the boughs whereof were once covered with ivy; in the thick of which king Charles II. sat in the daytime with colonel Careless, and in the night lodged in Boscobel-house; so that they are mistaken who speak of it as an old hollow oak, it being then a gay flourishing tree, surrounded with many more. The poor remains thereof are now fenced in with a handsome wall, with this inscription over the gate in gold-letters: *Fœlicissimam arborem quam in æsylum potentissimi regis Caroli II. Deus op. max. per quem reges regnant, hic crescere voluit, &c.*

ROYAL-society. See **SOCIETY**.

ROYALTIES, the rights of the king, otherwise called the king's prerogative, and the regalia. See the articles **PREROGATIVE** and **REGALIA**.

ROYAN, a castle of France, in the province of Saintonge, situated at the mouth of the river Garonne, thirty miles south of Rochelle.

ROYENA, **AFRICAN BLADDER-NUT**, in botany, a genus of the decandria-digynia class of plants, the corolla whereof is formed of a single petal; the tube is of the length of the calyx; the limb is patent, reflex, and divided into five oval segments; the fruit is a roundish capsule, formed of four valves, marked with four furrows, but containing only one cell; the seeds are four oblong triangular nuts, included in a calyptra.

ROYSTON, a market-town, situated in the counties of Hertford and Cambridge, thirty-eight miles north of London.

RUATAN, an island in the gulph of Honduras, in North America: west long. 89°, and north lat. 16°.

RUBARB. See the article **RHUBARB**.

RUBBING. See the articles **ATTRITION** and **FRICTION**.

RUBELLIO, in ichthyology, the name whereby some authors call the roach. See the article **CYPRINUS**.

RUBETA, the **TOAD**, in zoology. the article **TOAD**.

RUBIA, **MADDER**, in botany, a genus the tetrandria-monogynia class of plants, the corolla whereof consists of a single plane acute petal, hollowed at the base and divided into four segments; the fruit consists of two succulent, smooth, roundish berries, growing together; the seeds single, roundish, and umbilicated. plate CCXXXV. fig. 2.

For the several uses of this plant in dyeing, &c. see the article **MADDER**.

RUBICAN, in the manege. A horse said to be of a rubican colour, when bay, sorrel, or black, with a light grey or white upon the flanks, but so that the grey or white is not predominant there.

RUBIFYING, in chemistry, the act of turning a thing red by the force of heat, &c.

RUBIGALIA, in antiquity, a feast celebrated by the Romans, in honour of the god Rubigus, or the goddess Rubigo, to engage those deities to preserve the corn from blights and mildews.

The rubigalia were instituted by Numa in the eleventh year of his reign, and were celebrated on the seventh of the Calends of May.

RUBIGO, a disease incident to corn, commonly called Mildew, being a species of blight. See the article **BLIGHT**.

RUBININSKA, one of the northern provinces of Russia, bounded by the province of Dwina on the north, by Syriane on the east, by Belozero on the south, and by the lake of Onega on the west.

RUBRIC, *rubrica*, in the cannon-law, signifies a title or article in certain antiq. law-books; thus called because written as the titles of the chapters in our antiq. Bibles are, in red letters.

Rubrics also denote the rules and directions given at the beginning, and in the course of, the liturgy, for the order and manner in which the several parts of divine office are to be performed. There are general rubrics and special rubrics, a rubric for the communion, &c. In the Roman Missal and breviary are rubrics for matins, for lauds, for translation of beatifications, commemorations, &c.

RUBRICA, in natural history, a name given to several kinds of marles and ochres, the two principal of which are the rubrica fabrilis of authors, being a fine heavy red marle, commonly called red ochre, and used by painters, &c. See the article **MARBLE**.

MARLE and REDDLE. The other, called the rubrica sinopica of the antients, is a fine heavy purple ochre, much used both in painting and medicine. See the article **OCHRE**.

RUBUS, the **BRAMBLE** and **RASPBERRY-BUSH**, in botany, a genus of the icosa-andria-pentagynia class of plants, the corolla whereof consists of five roundish erecto-patent petals, of the length of the cup, and inserted into it; the fruit is a compound berry; the acini it is composed of are roundish, and arranged into a cluster, convex at top and concave below, each acinus has only one cell; the seeds are single and oblong; the receptacle of the pericarpia is conic; the acini in most of the species grow together so as to be inseparable without breaking. See plate **CCXXXV. fig. 4.**

The use of this plant in medicine is as a refrigerant and astringent, and therefore the fruit leaves, &c. are recommended in dysenteries, vomitings, hæmorrhages of the womb, nose, &c.

RUBY, *rubinus*, in natural history, a species of the chrostitima class of gems, being a beautiful gem of a red colour with an admixture of purple. See the article **GEM**.

This in its most perfect and best coloured state, is a gem of prodigious beauty and extreme value; it is often found perfectly pure and free from blemishes or foulness, but much more frequently debased greatly in its value by them, especially in the larger specimens. It is of very great hardness, equal to that of the sapphire, and second only to the diamond. It is various in size, but less subject to variations in its shape than most of the other gems. It is usually found very small, its most common size being equal to that of the head of the largest sort of pins; but it is found of four, eight, or ten carats; and sometimes, though very rare, up to twenty, thirty, or forty. It is never found of an angular or crystalliform sharp, but always of a pebble like figure, often roundish, sometimes oblong and much larger at one end than at the other, and in some sort resembling a pear, and is usually flatted on one side. It commonly is naturally so bright and pure on the surface, as to need no polishing; and when its figure will admit of being set without cutting, it is often worn in its rough state, and with no other than its native polish. Our jewellers are very nice, though not perfectly determinate, in their distinctions of this gem, know-

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ing it, in its different degrees of colour, under three different names: the first is simply the ruby, the name given it in its deepest coloured and most perfect state: the second is the spinel ruby; under this name they comprehend those rubies which are of a somewhat less bright colour than the ruby simply so called: the third is the balais-ruby; under this name they express a pale yet a very bright ruby, with a less admixture of the purple tinge than in the deeper coloured one; this is of less value than the deeper one.

We have the true ruby only from the East-Indies; and the principal mines of it are in the kingdom of Pegu and the island of Ceylon. We have in Europe crystals tinged to the colour of the ruby, but they have nothing of its lustre or hardness. The ruby seems to owe its colour to gold, it being possible to separate a small portion of gold from the little native rubies, and also to give the true colour of the ruby to fictitious paste by means of that metal.

The way of preparing a metalline colour from gold and tin, for tinging glass of a ruby colour is, according to Shaw, as follows: Dissolve gold in aqua-regia, and dilute the fine yellow solution with a large proportion of fair water; to the mixture add a sufficient quantity of a saturated solution of tin, made also in aqua-regia, at several times, and a most beautiful red or purple-coloured powder will soon fall to the bottom of the containing glass: decant the liquor and dry the powder, a few grains whereof being melted along with white crystalline glass will tinge it throughout of an extremely fine purple or ruby colour.

In M. Savary's *Dict. de Commerce*, we have the following table of the value of rubies, from one carat, or four grains, to ten carats:

	l.	s.	d.
A ruby of one carat is worth	1	15	00
Of two - - - - -	9	00	00
Of three - - - - -	22	10	00
Of four - - - - -	33	15	00
Of five - - - - -	45	00	00
Of six - - - - -	67	10	00
Of seven - - - - -	84	00	00
Of eight - - - - -	106	00	00
Of nine - - - - -	150	00	00
Of ten - - - - -	216	00	00

RUBY, in heraldry, denotes the red colour wherewith the arms of noblemen are blazoned; being the same which in the arms of others, not noble, is called gules. See the article **GULES**.

RUCTATION, BELCHING, a ventosity arising from indigestion, and discharging itself at the mouth with a very disagreeable noise. There are belches owing to repletion, and others to inanition, or emptiness. Quincy says hypochondriac and hysteric persons are particularly liable to this disorder. They are rather to be cured with proper stomachics than carminatives and hot liquors.

RUDBECKIA, DWARF SUN FLOWER, in botany a genus of the syngenesia-polygamia class of plants, the compound flower of which is radiated; but the hermaphrodite corollulæ of the disc are tubulose and very numerous; the stamina are five very short capillary filaments; and there is a small orbiculated seed after each of the hermaphrodite corollulæ, and are all contained in the cup, affixed to a paleaceous receptacle.

RUDDER, in navigation, a piece of timber turning on hinges in the stern of the ship, and which, opposing sometimes one side to the water and sometimes another, turns or directs the vessel this way or that. See the article **SHIP**.

The rudder of a ship is a piece of timber hung on the stern posts by four or five iron-hooks, called pintles, serving as it were for the bridle of a ship to turn her about at the pleasure of the steers-man. The rudder being perpendicular; and without-side the ship, another piece of timber is fitted to it at right angles, which comes into the ship, by which the rudder is managed and directed. This latter properly is called the helm or tiller; and sometimes, though improperly, the rudder itself. The power of the rudder is reducible to that of the lever. See the article **LEVER**.

As to the angle the rudder should make with the keel, it is shewn, that in the working of ships, in order to stay or bear up the soonest possible, the tiller of the rudder ought to make an angle of 35° with the keel. A narrow rudder is best for a ship's sailing, provided she can feel it; that is, be guided and turned by it: for a broad rudder will hold much water when the helm is put over to any side; but if a ship have a fat quarter, so that the water cannot come quick and strong to her rudder, she will require a broad rudder. The aft-most part of the rudder is called the rake of the rudder.

RUDENTURE, in architecture, the figure of a rope or staff, sometimes plain, sometimes carved, with which the third part

of the flutings of columns are frequently filled up.

There are also rudentures in relieve laid on the naked of pilasters not fluted: an instance of which we have in the church of St. Sapienza at Rome.

RUDERATION, in building a term used by Vitruvius for the laying of pavement with pebbles.

To perform the ruderation it is necessary that the ground be well beaten, to make it firm, and to prevent it from cracking; then a stratum of little stones are laid, to be afterwards bound together with mortar made of lime and sand. If the sand be new, its proportion may be to the lime as three to one; if dug out of old pavements or walls, as five to two. Ruderation, Daviler observes, is also used by Vitruvius for the coarsest and most artless kind of masonry, where a wall is as it were cobbled up.

RUDIARIUS, in antiquity, a veteran gladiator who had got a discharge from the service. See **GLADIATOR**.

RUDIMENTS, *rudimenta*, the first principles or grounds of any art or science, called also the elements thereof. See the article **ELEMENT**.

RUDIS, a knotty rugged stick, which the prætor among the Romans gave the gladiators as a mark of their freedom and dismissal.

RUE, *ruta*, in botany. See **RUTA**.

RUELLIA, in botany, a genus of the didynamia angiospermia class of plants, the corolla whereof consists of a single petal: the tube is of the length of the cup, with a patulous inclined neck: the limb is quinquefid, patent, and obtuse, with the two upper lacinii more reflex than the rest: the fruit is a round capsule, acuminate on both sides, of the length of the cup, semibilocular and bivalve: the seeds being a few in number, are roundish and compressed.

RUFF, in ichthyology, a species of the perca, with a cavernous head, and only one fin on the back. See **PERCA**.

The usual size to which this species arrives is four or five inches, though sometimes it will grow longer: the head in its general form is compressed, but flattened a little between the eyes; the beak is somewhat acute; the breast and belly are flattened; the eyes are large, and of a variety of colours; the teeth are small but numerous, there is a row of them in each jaw, and on the anterior part of the palate there is a number of teeth, so

minute

minute that they can scarce be seen ; the lateral line is somewhat crooked ; the colour of the fish is a brownish yellow with a number of black spots ; the fin on the back has twenty eight rays, the pectoral-fins eighteen, and the belly-fins each six.

RUFF, in ornithology, a species of the *tringa*, with a granulated face, and a red beak and legs : it is about the bigness of the common jack daw. See the article *TRINGA*.

The head is round, and covered with a large tuft of feathers, except the anterior part, which is naked, but the skin is elegantly granulated with small red tubercles, disposed regularly and closely over it ; the eyes are large, their aspect bright and piercing, and their iris of a bright hazel-colour ; the beak is moderately long and obtuse at the end, it is of a bright fine red at the base, and sometimes all over ; the upper chap is a little longer than the under one ; the tongue is extended to the very top of the beak. See plate CCXXXV. fig. 3.

RUFFTER-HOOD, among falconers, a plain leathern hood, large and open behind, to be worn by an hawk when she is first drawn.

RUGEN, an island of the Baltic-sea, on the coast of Germany, being part of the dutchy of swedish Pomerania, separated from the continent by a narrow channel : this island is thirty miles long, and near as many broad.

RUINS, a term particularly used for magnificent buildings fallen into decay, by length of time, and whereof there only remains a confused heap of materials.

RULE, *regula*, in matters of literature, a maxim, canon, or precept, to be observed in any art or science.

The rules of philosophizing, of reasoning, of method, as also those to be observed in logic, morality, poetry, medicine, rhetoric, &c. have been already delivered under the articles *PHILOSOPHY*, *REASONING*, &c.

RULE, in arithmetic, denotes an operation performed with figures, in order to discover sums or numbers unknown.

The fundamental rules are addition, subtraction, multiplication, and division. See the article *ADDITION*, &c.

But besides these, there are other rules denominated from their use ; as the rule of alligation, fellowship, interest, practice, reduction, &c. See the article *ALLIGATION*, &c.

RULE OF THREE, GOLDEN RULE, or RULE OF PROPORTION, is one of the most essential rules of arithmetic ; for the foundation of which see the articles *PROPORTION*.

It is called the Rule of Three from having three numbers given to find a fourth ; but more properly, the Rule of Proportion, because by it we find a fourth number proportional to three given numbers : and because of the necessary and extensive use of it, it is called the Golden Rule. But to give a definition of it, with regard to numbers of particular and determinate things, it is the rule by which we find a number of any kind of things, as money, weight, &c. so proportional to a given number of the same things, as another number of the same or different things, is to a third number of the last kind of thing. For the four numbers that are proportional must either be all applied to one kind of things ; or two of them must be of one kind, and the remaining two of another : because there can be no proportion, and consequently no comparison of quantities of different species : as for example, of three shillings and four days ; or of six men and four yards.

All questions that fall under this rule may be distinguished into two kinds : the first contains these wherein it is simply and directly proposed to find a fourth proportional to three given numbers taken in a certain order : as if it were proposed to find a sum of money so proportioned to one hundred pounds as sixty four pounds ten shillings is to eighteen pounds six shillings and eight pence, or as forty pounds eight shillings is to six hundred weight. The second kind contains all such questions wherein we are left to discover, from the nature and circumstances of the question, that a fourth proportional is sought ; and consequently, how the state of the proportion, or comparison of the term, is to be made ; which depends upon a clear understanding of the nature of the question and proportion. After the given terms are duly ordered, what remains to be done is to find a fourth proportional. But to remove all difficulties as much as possible, the whole solution is reduced to the following general rule, which contains what is necessary for solving such questions wherein the state of the proportion is given ; in order to which it is necessary to premise these observations.

1. In all questions that fall under the following rule there is a supposition and a demand: two of the given numbers contain a supposition, upon the conditions whereof a demand is made, to which the other given term belongs; and it is therefore said to raise the question; because the number sought has such a connection with it as one of these in the supposition has to the other. For example; if 3 yards of cloth cost 4 l. 10 s. (here is the supposition) what are 7 yards 3 quarters worth? here is the demand or question raised upon 7 yards 3 quarters, and the former supposition.

2. In the question there will sometimes be a superfluous term; that is, a term which, though it makes a circumstance in the question, yet it is not concerned in the proportion, because it is equally so in both the supposition and demand. This superfluous term is always known by being twice mentioned either directly, or by some word that refers to it. Example, if 3 men spend 20 l. in 10 days, how much, at that rate, will they spend in 25 days? Here the 3 men is a superfluous term, the proportion being among the other three given terms, with the number sought; so that any number of men may be as well supposed as 3.

Rule. First, The superfluous term (if there is one) being cast out, state the other three terms thus: of the two terms in the supposition, one is like the thing sought (that is, of the same kind of thing the same way applied); set that one in the second or middle place; the other term of the supposition set in the first place, or on the left hand of the middle; and the term that raises the question, or with which the answer is connected, set in the third place, or on the right hand; and thus the extremes are like one another, and the middle term like the thing sought: also the first and second terms contain the supposition, and the third raises the question; so that the third and fourth have the same dependance or connection as the first and second. This done,

Secondly, Make all the three terms simple numbers of the lowest denominations expressed, so that the extremes be of one name. Then,

Thirdly, Repeat the questions from the numbers thus stated and reduced (arguing from the supposition to the demand) and observe whether the number sought ought to be greater or lesser than the middle term, which the nature of the

question, rightly conceived, will determine; and accordingly, multiply the middle term by the greater or lesser extreme, and divide the product by the other, the quote is like the middle term, and is the complete answer, if there is no remainder; but if there is, then, Fourthly, reduce the remainder to the denomination next below that of the middle term, and divide by the same divisor, the quotient is another part of the answer in this new denomination. And if there is here also a remainder, reduce it to the next denomination, and then divide. Go on thus to the lowest denomination, where, if there is a remainder, it must be applied fraction-wise to the divisor; and thus you will have the complete answer in a simple or mixed number.

Note, If any of the dividends is less than the divisor, reduce it to the next denomination, and to the next again, till it be greater than, or equal to, the divisor.

EXAMPLES.

Quest. I. If 3 yards of cloth cost 8 s. what is the price of 15 yards? Answ. 40 s. or 2 l.

Work.

$$\begin{array}{r} \text{yds. s. yds.} \\ 3-8-15 \\ \quad 15 \\ 3 \overline{)120} 40 \text{ s.} \end{array}$$

Explanation. 3 yards and 8 s. contain the supposition, and 8 s. is like the thing sought; therefore 8 s. is the middle term, and yards on the left: then the demand arises upon 15 yards, and therefore it is on the right. Again, from the nature of the question it is plain, that 15 yards require more than 3 yards, *i. e.* the answer must be greater than the middle term; wherefore 8 s. is to be multiplied by 15 yards; the product is 120 s. which divided by 3 yards, quotes 40 s. without a remainder; so 40 s. or 2 l. is the number sought.

Quest. II. If 4 lb. of sugar cost 2 s. 9 d. what is the value of 18 lb.? Answer, 12 s. 4 $\frac{1}{2}$ d.

Work.

$$\begin{array}{r} \text{lb. s. d. lb.} \\ 4-2-9-18 \\ \quad 12 \\ \quad 33 \text{ d.} \\ \quad 18 \\ \quad 264 \\ \quad 33 \\ 4 \overline{)594} 18 \text{ d.} \\ \quad 2 \\ \quad 4 \\ 4 \overline{)8} 2 \text{ farthings.} \end{array}$$

Expl. The supposition is in 4 lb. and 2 s. 9 d. this last term being like the thing sought, which is connected with 18 lb. wherefore the terms are stated according to the rule: then the middle term being mixed, it is to be reduced to pence; and then argue thus; if 4 lb. cost 33 d. 18 lb. must cost more; therefore multiply 33 d. by 18 lb.

18 lb. and divide their product by 4; the quotient is 148 d. and 2 remains, which is to be reduced to farthings, and the product divided by the former quotient, gives 2; so the answer is 148 d. 2 farthings, or 12 s. 4 $\frac{1}{2}$ d. because 148 d. is by reduction, 12 s. 4 d.

Quest. III. What is the price of 50 l. of tobacco, when 32 lb. 12 oz. cost 4 l. 10 s.? Answ. 6 l. 17 s. 4 $\frac{1}{4}$ d.

Work.

lb.	oz.	l.	s.	lb.	oz.	s.	oz.
32	12	4	10	50	524	90	800
16	20			16		800	
194	90			300	524	72000	137 s.
33				50	524		
524				800		1960	
						1572	
						3880	
						3668	

Remainder 212

12

524 | 2544 | 4 d.

2096

Remainder 448

4

524 | 1792 | 3 $\frac{2}{3}$ q.

1572

220

Quest. IV. What are 5 yards of ribband worth, whereof 63 yards 2 quarters cost 5 l.? Answ. 7 s. 10 d. 1 $\frac{1}{2}$ q.

Work.

Explanation. The yds. qrs. l. yds. terms stated, and reduced according to the rule, I find the answer ought to be less than the middle term; therefore I multiply 5 l. by 20 quarters, but the product is less than the divisor; and so it is to be reduced to shillings, which makes 2000 s. this divided by 254, quotes 7 s. The rest of the work is plain.

63 : 2—5—5
4 4
254 qrs.—5—20 qrs.

20

100

20

254 | 2000 | 7 s.

1778

Rem. 222

12

254 | 2664 | 10 d.

254

124

4

254 | 496 | 1 $\frac{2}{3}$ q.

254

242

for 6 months? Answ. 2 months 16 days, reckoning 28 days to 1 month.

Work.

men. mths. men.

3—6—7

3

7 | 18 | 2 months.

14

Rem. 4

28

7 | 112 | 16 days.

Explanation. The 25 l. is a superfluous number; then the supposition is in the 3 men and 6 months, and the demand regards the 7 men: the terms being all simple, you are to argue thus; if 3 men are boarded

6 months for 25 l. (or any sum), 7 men will be boarded for the same a shorter time: therefore multiply 6 months by 3, and divide the product 18 by 7, whereby the answer is found to be 2 months and 16 days.

Quest. VI. If the carriage of 3 hundred weight cost 10 s. for 40 miles, how much ought to be carried for the same price 25 miles and 3 quarters? Answ. 4 cwt. 2 qr. 17 $\frac{2}{3}$ lb.

Work.

M. Cwt. M. qr.

40—3—25 : 3

4 4

160—3—103

160

103 | 480 | 4 Cwt.

412

Rem. 68

4

103 | 272 | 2 qrs.

206

Rem. 66

28

528

132

103 | 1848 | 17 $\frac{2}{3}$ lb.

103

818

721

97

Explanation. The superfluous number here is 10 s. and from the other three terms stated and reduced, it is argued thus; if 3 Cwt. is carried 160 quarters of a mile for 10 s. then a greater weight will be carried for the same price 103 qrs. of a mile; therefore multiply 3 by 160, and divide the product 480 by 103, the answer is 4 Cwt. 2 quarters 17 $\frac{2}{3}$ lb.

Note. The first four questions are what is called the rule of three direct, that is, where the third term being greater or lesser than the first, requires that the answer also be greater or lesser than the second term. The two last questions are of the rule of three indirect, or reverse; where the third term being greater

Quest. V. What time will 7 men be boarded for 25 l. when 3 men paid 25 l.

leffer than the first, requires the fourth contrarily leffer or greater than the second. But we have comprehended both in one general rule. And from this observation may be learned what questions are of either kind.

RULE, in a monastic sense, a system of laws or regulations, whereby religious houses are governed, and which the religious make a vow, at their entrance, to observe. Such are the rules of the augustins, benedictins, carthusians, franciscans, &c. See **AUGUSTINS**, &c.

RULES of Court, in law, are certain orders made, from time to time, in the courts of law, which attornies are bound to observe, in order to avoid confusion; and both the plaintiff and defendant are at their peril also bound to pay obedience to rules made in court relating to the cause depending between them.

It is to be observed, that no court will make a rule for any thing that may be done in the ordinary course; and that if a rule be made, grounded upon an affidavit, the other side may move the court against it, in order to vacate the same, and thereupon shall bring into court a copy of the affidavit and rule. On the breach and contempt of a rule of court an attachment lies; but it is not granted for disobedience to a rule when the party has not been personally served; nor for disobeying a rule made by a judge in his chamber, which is not of force to ground a motion upon, unless the same be entered.

A rule of court is granted every day the courts at Westminster sit, to prisoners of the king's bench, or fleet, prisons, to go at large about their private affairs.

RULE, or **RULER**, an instrument of wood or metal, with several lines delineated on it, of great use in practical mensuration. When a ruler has the lines of chords, tangents, sines, &c. it is called a plane scale. See the article **SCALE**.

The carpenter's joint-rule is an instrument usually of box, &c. twenty-four inches long, and one and a half broad; each inch being subdivided into eight parts. On the same side with these divisions, is usually added Gunter's line of numbers. On the other side, are the lines of timber and board-measure; the first beginning at 82, and continued to 36, near the other end; the latter is numbered from 7 to 16, 4 inches from the other end.

Use of the carpenter's joint-RULE. The application of the inches, in measuring

lengths, breadths, &c. is obvious. The use of the Gunter's line, see under the article **GUNTER'S LINE**.

The use of the other side is all we need here meddle with: 1. The breadth of any surface, as board, glass, &c. being given, to find how much in length makes a square foot. Find the number of inches the surface is broad, in the line of board-measure, and right against it the number of inches required. Thus if the surface were eight inches broad, eighteen inches will be found to make a superficial foot. Or more readily thus. Apply the rule to the breadth of the board, or glass, that end, marked 12, being equal with the edge, the other edge of the surface will shew the inches and quarters of inches, which go to make a square foot. 2. Use of the table at the end of the board-measure. If a surface be one inch broad, how many inches long will make a superficial foot? look in the upper row of figures for one inch, and under it in the second row is twelve inches, the answer to the question.

Use of the line of timber-measure. This resembles the former; for having learned how much the piece is square, look for that number on the line of the timber-measure; the space thence to the end of the rule is the length which, at the breadth, makes a foot of timber. Thus if the piece be nine inches square, the length necessary to make a solid foot of timber, is $21 \frac{1}{3}$ inches. If the timber be small, and under nine inches square, seek the square in the upper rank of the table, and immediately under it is the feet and inches that make a solid foot. If the piece be not exactly square, but broader at one end than the other, the method is to add the two together, and take half the sum for the side of the square. For round timber the method is to girth it round with a string, and allow the fourth part for the side of the square; but this method is erroneous, for hereby you lose nearly one fifth of the true solidity; though this is the method at present practised in buying and selling timber.

The mason's rule is twelve or fifteen feet long, in order to be applied under the level to regulate the courses, and make the piedroits equal, &c.

Everard's sliding RULE, has already been described under the article **GAUGING**. *Coggeshal's sliding RULE*, is chiefly used for measuring the superficies and solidity

of timber, &c. It consists of two rulers, each a foot long, one of which slides in a groove made along the middle of the other, as represented in plate CCXXXIV. fig. 4.

On the sliding side of the rule are four lines of numbers, three whereof are double; that is, are lines to two radiuses; and one, a single broken line of numbers: the three first, marked A, B, C, are figured 1, 2, 3, &c. to 9; then 1, 2, 3, &c. to 10; their construction, use, &c. being the same as those of Everard's sliding rule. The single line, called the girt-line, and marked D, whose radius is equal to the two radiuses of any of the other lines, is broke for the easier measurement of timber, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, &c. From 4 to 5 it is divided into ten parts, and each tenth subdivided into 2, and so on, from 5 to 6, &c.

On the backside of the rule are, 1. A line of inch-measure, from 1 to 12; each inch being divided and subdivided. 2. A line of foot measure, consisting of one foot, divided into 100 equal parts, and figured 10, 20, 30, &c. The back part of the sliding piece is divided into inches, halves, &c. and figured from 12 to 24; so that when drawn wholly out, there may be a measure of two feet.

Use of Coggeshal's RULE for measuring plane superficies. 1. To measure a square: suppose, for instance, each of the sides 5 feet; set 1 on the line B, to 5 on the line A; then against 5 on the line B is 2.5 feet, the content of the square on the line A. 2. To measure a long square. Suppose the longest side 18 feet, and the shortest 10; set 1 on the line B, to 10 on the line A; then against 18 feet, on the line B, is 180 feet, the contents on the line A. 3. To measure a rhombus. Suppose the side 12 feet, and the length of a perpendicular let fall from one of the obtuse angles, to the opposite side, 9 feet; set 1 on the line B, 12, the length of the side on the line A; then against 9, the length of the perpendicular on the line B, is 108 feet, the content. 4. To measure a triangle. Suppose the base 7 feet, and the length of the perpendicular let fall from the opposite angle to the base 4 feet; set 1 on the line B, to 7 on the line A; then against half the perpendicular, which is 2 on the line B, is 14 on the line A, for the content of the triangle. 5. To find the content of a circle, its diameter being given. Sup-

pose the diameter 3.5 feet; set 17 on the girt line D, to 95 on the line C; then against 3.5 feet on D, is 9.6 on C, which is the content of the circle in feet. 6. To find the content of an oval or ellipsis. Suppose the longest diameter 9 feet, and the shortest 4. Find a mean proportional between the two, by setting the greater 9 on the girt line, to 9 on the line C; then against the less number 4 on the line C is 6, the mean proportional sought. This done, find the content of a circle, whose diameter is 6 feet; this, when found, by the last article, will be equal to the content of the ellipsis sought.

Use of Coggeshal's RULE, in measuring timber. 1°. To measure timber the usual way. Take the length in feet, half feet, and, if required, quarters; then measure half way back again; then girt the tree with a small cord or line; double this line twice very evenly, and measure this fourth part of the girt or perimeter, in inches, halves, and quarters. The dimensions thus taken, the timber is to be measured as if square, and the fourth of the girt taken for the side of the square, thus; set 12 on the girt line D, to the length in feet on the line C; then against the side of the square, on the girt-line D, taken in inches, you have, on the line C, the content of the tree in feet. For an instance: suppose the girt of a tree, in the middle, be 60 inches, and the length 30 feet, to find the content, set 12 on the girt-line D, and 30 feet on the line C; then against 15, one fourth of 60, on the girt-line D, is 46.8 feet, the content on the line C. If the length should be 9 inches, and the quarter of the girt 35 inches; here, as the length is beneath a foot, measure it on the line of foot-measure, and see what decimal part of a foot it makes, which you will find .75. Set 12, therefore, on the girt-line, to 75 on the first radius of the line C, and against 35 on the girt-line is 64 feet on C, for the content. 2°. To measure round timber the true way. The former method, though that generally in use, is not quite just. To measure timber accurately, instead of the point 12 on the girt-line, use another, viz. 10.635; at which there should be placed a center-pin. This 10.635 is the side of a square equal to a circle, whose diameter is 12 inches. For an instance: suppose the length 15 feet, and $\frac{1}{2}$ of the girt 42 inches, set the point 10.635 to 15, the length;

length; then against 42 on the girt-line is 233 feet for the content sought; whereas by the common way, there arises only 184 feet. In effect, the common measure is only to the true measure, as 11 to 14.

3°. To measure a cube. Suppose the sides to be 6 feet each; set 12 on the girt-line D, to 6 on C; then against 72 inches (the inches 6 feet) on the girt-line, is 216 feet on C, which is the content required.

4°. To measure unequally-squared timber; that is where the breadth and depth are not equal. Measure the length of the piece, and the depth (at the end) in inches: then find a mean proportional between the breadth and depth of the piece. This mean proportional is the side of a square, equal to the end of the piece; which found, the piece may be measured as square timber. For an instance: let the length of the piece of timber be 13 feet, the breadth 23 inches, and the depth 13 inches; set 23 on the girt-line D, to 23 on C; then against 13 on C is 17.35 on the girt-line D, for the mean proportional. Again, setting 12 on the girt-line D, to 13 feet, the length of the line C; against 17.35 on the girt-line is 27 feet, the content.

5°. To measure taper timber. The length being measured in feet, note one-third of it; which is found thus: set 3 on the line A, to the length on the line B; then against 1 on A is the third part on B; then, if the solid be round, measure the diameter at each end in inches, and subtract the less diameter from the greater; add half the difference to the less diameter; the sum is the diameter in the middle of the piece. Then set 13.54 on the girt to the length of the line C, and against the diameter in the middle on the girt-line is a fourth number on the line C. Again, set 13.54 on the girt-line to the third part of the length on the line C; then against half the difference on the girt-line is another fourth number on the line C; these two fourth numbers, added together, give the content. For an instance: let the length be 27 feet (one third whereof is 9) the greater diameter 22 inches, and the lesser 18; the sum of the two will be 40, their difference 4, and half the difference 2, which, added to the less diameter, gives 20 inches for the diameter in the middle of the piece. Now set 13.54 on the girt-line, to 27 on the line C, and against 20 on D is 58.9 feet. Again, set 13.54 of the girt line

to 9 on the line C; and against 20 on girt-line (represented by 20) is 18 parts; therefore, by adding 58.9 to .196 feet, the sum is 59.096 the content.

If the timber be square, and have same dimensions; that is, the length 27 feet, the side of the greater end 22 inches, and that of the lesser 18 inches, to find the content, set 12 on the girt-line to 27, the length on the line C, against 20 inches, the side of the middle square on the girt-line, is 75.4 feet. Again, set 12 on the girt-line to 9 inches, one-third of the length, on the line C, and against 2 inches, half the difference of the sides of the squares of the ends on the girt-line, is .25 parts of a foot; both together make 75.65 feet, the content of the solid.

The girt or circumference of a tree, round piece of timber given; to find the side of the square within, or the number of inches of a side, when the round timber is squared. Set 10 on A to 9 on B, then against the girt on A are the inches for the side of a square on the line B.

RUM, a species of brandy, or vinous spirit distilled from sugar-canes. See **BRANDY**, **DISTILLATION**, and **SPIRIT**.

Rum, according to Dr. Shaw, distilled from simple sugar-spirit, in that it contains more of the natural flavour essential oil of the sugar-cane; a great deal of raw juice and parts of the cane itself being often fermented in the liquor or solution, of which the rum is prepared. The unctuous or oily flavour of rum is often supposed to proceed from the large quantity of fat used in boiling the sugar, which fat, indeed, if coarse, will usually give a stinking flavour to the spirit. Our distillations of the sugar liquor wash, from our refining sugar-house, but this is nothing of kin to the flavour of the rum, which is really the effect of the natural flavour of the cane.

The method of making rum is thus. When a sufficient stock of the material is got together, they add water to it, and ferment them in the common method, though the fermentation is always carried on very slowly at first; because the beginning of the season for making rum in the islands, they want yeast, or some other ferment to make it work; by degrees, after this they procure sufficient quantity of the ferment, which rises up as a head to the liquor in operation, and thus they are able at

wards to ferment and make their rum with a great deal of expedition, and in large quantities.

When the wash is fully fermented, or to a due degree of acidity, the distillation is carried on in the common way, and the spirit is made up proof: though sometimes it is reduced to a much greater strength, nearly approaching to that of alcohol or spirit of wine, and it is then called double distilled rum. It might be easy to rectify the spirit, and bring it to much greater purity than we usually find it to be of; for it brings over in the distillation a very large quantity of the oil; and this is often so disagreeable, that the rum must be suffered to lie by a long time to mellow before it can be used; whereas, if well rectified, it would grow mellow much sooner, and would have a much less potent flavour.

The best state to keep rum in, both for exportation and other uses, is doubtless that of alcohol, or rectified spirit. In this manner it would be transported in one half the bulk it usually is, and might be let down to the common proof-strength with water when necessary: for the common use of making punch, it would likewise serve much better in the state of alcohol; as the taste would be cleaner; and the strength might always be regulated to a much greater exactness than in the ordinary way.

The only use to which it would not so well serve in this state, would be the common practice of adulteration among our distillers; for when they want to mix a large portion of cheaper spirit with the rum, their business is to have it of the proof strength, and as full of the flavouring oil as they can, that it may drown the flavour of the spirits they mix with it, and extend its own. If the business of rectifying rum was more nicely managed, it seems a very practicable scheme to throw out so much of the oil, as to have it in the fine light state of a clear spirit, but lightly impregnated with it; in this case it would very nearly resemble arrac, as is proved by the mixing a very small quantity of it with a tasteless spirit, in which case the whole bears a very near resemblance to arrac in flavour.

Rum is usually very much adulterated in England; some are so barefaced as to do it with malt-spirit; but when it is done with molasses-spirit, the tastes of

both are so nearly allied that it is not easily discovered. The best method of judging of it is, by setting fire to a little of it; and when it has burnt away all the inflammable part, examining the phlegm both by the taste and smell.

Rum, on importation, pays a duty of

48. $\frac{80\frac{1}{2}}{100}$ d. the gallon.

RUMB, or RHUMB. See RHUMB.

RUMELIA, in geography, the same with ancient Greece, now a part of Turkey in Europe. See TURKEY.

RUMEN, in comparative anatomy, the paunch, or first stomach of such animals as chew the cud, thence called ruminant animals.

The rumen is by far the largest of all the stomachs, and in it the whole mass of crude aliments, both solid and liquid, lies and macerates, to be thence transmitted to the mouth to be again chewed, comminuted, and fitted for farther digestion in the other ventricles. See the article DIGESTION.

The ruminant animals, Mr. Ray observes, are all hairy quadrupeds, viviparous, and have four stomachs; they also want the dentes primores, or broad teeth in the fore part of the upper jaw, and are furnished with that kind of fat called suet, sebum. See QUADRUPED.

We even find instances of ruminating men, particularly of one at Bristol, of whom Dr. Stare gives the following account, in Phil. Trans. n^o 193. He would begin to chew his meat over again within a quarter of an hour after his meals, if he drank upon them; if not, it was somewhat longer: this chewing after a full meal lasted about an hour and an half. The victuals, upon their return into the mouth, tasted somewhat more pleasant than at first; and liquids, as broths and spoon-meats, returned all one as dry and solid food; and he always observed, that if he eat variety of things, what he swallowed first, would again come up first to be chewed; also if this faculty intermitted at any time, it portended sickness, and he was never well till it returned again.

RUMEX, in botany, a genus of the hexandria-triynia class of plants, the flower of which consists of three connivent petals, of an oval figure: the seed is single, triquetrous, and contained in the corolla.

To this genus, among other species, belong

- long rhubarb, bloody dock, common sorrel, &c. See the articles RHUBARB, DOCK, and SORREL.
- RUMFORD, a market-town of Essex, ten miles east of London.
- RUMMAGE, in the sea-language, signifies to clear a ship's hold, or to remove goods from one place of it to another.
- RUMPFIA, in botany, a genus of the triandria-monogynia class of plants, the corolla of which consists of three oblong obtuse, and equal petals; its fruit is a coriaceous and turbinated drupe, with three furrows; and inclosing an oval trilocular nut, with a single triquetrous kernel in each cell.
- RUMSEY, a market town of Hampshire, nine miles south-west of Winchester.
- RUN, in the sea-language, denotes so much of a ship's hull, as is under water.
- RUNDLE, or ROUNDE, in heraldry, the same with pellet. See PELLET.
- RUNDLET, or RUNLET, a small vessel, containing an uncertain quantity of any liquor, from three to twenty gallons.
- RUNGS, in a ship, the same with the floor or ground timbers, being the timbers which constitute her floor, and are bolted to the keel, whose ends are rungh-heads.
- RUNG-heads, in a ship, are made a little bending, to direct the sweep or mold of the futtocks and navel timbers: for here the lines, which make the compass and bearing of a ship, do begin.
- RUNIC, a term applied to the language and letters of the antient Goths, Danes, and other northern nations.
- RUNNER, in the sea language, a rope belonging to the garnet, and to the two bolt-tackles. It is reeved in a single block, joined to the end of a pennant, and has at one end a hook to hitch into any thing, and at the other end a double block, into which is reeved the fall of the tackle, or the garnet, by which means it purchases more than the tackle would without it.
- RUNNET, or RENNET, the acid juice found in the stomachs of calves that have fed on nothing but milk, and are killed before the digestion is perfect.
- RUNNING of goods, a clandestine landing of goods, without paying the legal customs or duties for the same.
- RUNNING ROPES. See ROPE.
- RUNNING, in antiquity, made one of the exercises performed in the pentathlon or quintetium. See PENTATHLON.
- This exercise was in so great esteem a-

- mong the antient Greeks, that such prepared themselves for it, thought worth their while to burn or parch the spleen, because it was believed to be a hindrance to them. Indeed, all the exercises, that conduced to fit men for war, were more especially valued; and that swiftness was esteemed such in a eminent degree, appears from Homer giving his hero the epithet of ποδας ἀχλεις.
- RUPEE, ROUPIA, or ROUPIAS, name of a gold and silver coin, current in the East-Indies. See COIN.
- RUPELMONDE, a town of Flanders, situated on the river Scheld, six miles south of Antwerp. See RUPPLE.
- RUPERT'S DROPS, a sort of glass-drops with long and slender tails, which burst to pieces on the breaking off those tails in any part, said to have been invented by prince Rupert, and therefore called after his name. This surprising phenomenon is supposed to rise from hence, that while the glass is in fusion, or in a melted state, the particles of it are in state of repulsion; but being dropped in to cold water, it so condenses the particles in the external parts of their superficies, that they are easily reduced with the power of each others attraction, and by that means they form a sort of hard case, which keeps confined the before-mentioned particles in their repulsive state; but when this outer-case is broken by breaking off the tail of the drop, the said confined particles have then a liberty to exert their force, which they do by bursting the body of the drop, and reducing it to a very peculiar form of powder.
- RUPERT-FORT, a settlement belonging to the Hudson's-Bay company, situated at the bottom of the said bay, in west long. 80°, north lat. 51°.
- RUPICAPRA, in zoology, the CHAMOIS GOAT. See CHAMOIS and GOAT.
- RUPPIA, in botany, a genus of the triandria-tetragynia class of plants, without any flower-petals: there are no stamens, the antheræ being sessile: the fruit consists of four oval, cortical substances, pointed, and standing on the elongate styles, and in each is contained a single roundish seed.
- RUPPLE, a river of Brabant, which formed by Senne, Demer, and Dyle, falls into the Scheld at Rupelmonde.
- RUPTURE, in surgery, the same with hernia. See the article HERNIA.

Fig. 1. RUTA, RUE.



Fig. 2. RUBIA, MADDER.



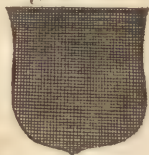
Fig. 4. RUBUS.



Fig. 3. The RUFF.



Fig. 5. SABLE.



RURAL, or **RUSTIC**, in general, denotes something that relates to the country.

RURAL DEAN, in church-history. See the article **DEAN**.

RUSCUS, **BUTCHER'S BROOM**, in botany, a plant of the dioecia-syngenesia class, with a globose monopetalous flower; and a globose trilocular berry for its fruit, with two seeds of the same shape in each cell. The root of this plant is one of the five aperient roots of the shops; being esteemed a powerful attenuant and resolvent, and therefore good in all chronic cases and obstructions of the viscera, as also to promote urine.

RUSH, *juncus*, in botany. See **JUNCUS**.

RUSMA, in the materia medica, the same with sory. See the article **SORY**.

RUSSIA, or **MUSCOVY**, a large empire, comprehending a vast extent of country, in the most northerly parts of Europe and Asia, from 24° to 130°, east long. and between 45° and 72° north lat.

Its capital cities are Moscow and Petersburg. See the articles **MOSCOW** and **PETERSBURG**.

RUSSIA-COMPANY, in commerce. See the article **COMPANY**.

R of a metal, the flower or calx thereof, procured by corroding and dissolving its superficial parts by some menstruum. Water is the great instrument or agent in producing rust; and hence oils, and other fatty bodies, secure metals from rust; water being no menstruum to oil, &c. and therefore not able to make its way through it.

All metals are liable to rust, even gold itself, if exposed to the fumes of sea salt.

RUST, or **BLIGHT** of Corn. See **BLIGHT**.

RUSTIC, in architecture, implies a manner of building in imitation of nature, rather than according to the rules of art.

RUSTIC WORK, is where the stones in the face, &c. of a building, instead of being smooth, are hatched, or picked with the point of a hammer.

RUSTIC ORDER, that decorated with rustic quoins, rustic work, &c.

RUSTRE, in heraldry, a bearing of a diamond-shape, pierced through in the middle with a round hole. See plate **CCXXXIII**. fig. 4.

RUT, in hunting, the venery or copulation of deer. See **DEER**.

RUTA, **RUE**, in botany, a genus of the octandria-monogynia class of plants, with a rosaceous flower, usually consisting of four patent and hollow petals; its fruit consists of four capsules affixed to an

axis, or rather one gibbous capsule, with four lobes, and as many cells, in which are inclosed a great many kidney-shaped and angular seeds. See plate **CCXXXV**. fig. 1.

The dried herb is much used in medicine, by way of infusion; being esteemed an excellent alexipharmic and cephalic, and accordingly prescribed in the small-pox, measles, and hysteric and nervous cases; as also in peripneumonies and pleurisies, to strengthen the stomach, and to prevent the return of habitual colics.

Goat RUE, *galega*, a plant of the diadelphia decandria class, with a papilionaceous flower, and a long cylindric pod for its fruit.

It has been accounted a good sudorific, but is little used in the present practice.

Meadow RUE, *thalictrum*. See the article **THALICTRUM**.

Wall RUE, *ruta muraria*, the same with the adiantum album. See **ADIANTUM**.

Wild RUE, *harmala*, or *peganum*. See the article **PEGANUM**.

Book of RUTH, a canonical book of the Old Testament, being a kind of appendix to the book of Judges, and an introduction to those of Samuel; and having its title from the person whose story is here principally related. In this story are observable the antient rights of kindred and redemption, and the manner of buying the inheritance of the deceased, with other particulars of great note and antiquity.

RUTHYN, a market-town of Denbighshire eight miles south-east of Denbigh.

RUFICILLA, in ornithology, a bird called in english the redstart. See **RED**.

RUTILUS, in ichthyology, a fish called in english the roach. See **ROACH**.

RUTLAND, the least county in England, bounded by Lincolnshire, on the north-east; by Northamptonshire, on the south-east; and by Leicestershire, on the west and north west.

RUVO, a town of the kingdom of Naples, seventeen miles south-west of Barri.

RYAL, or **RIAL**. See **RIAL**.

RYE, *secale*, in botany. See **SECALE**.

Rye succeeds very well on any sort of dry land, even on the most barren gravel or sand. The farmers sow it about the beginning of September, after a summer's fallow, in the driest time they can. Two bushels of seed is the quantity generally allowed to an acre of land; but if it be ground newly broken up, or if it be

subject to worms, they then allow a peck more to the acre. A little sprinkling of dung, or mud, upon rye-land, will greatly advance the crop, though it is laid but half the thickness that it is for other corn; its produce is commonly about twenty bushels upon an acre.

RYE, in geography, a borough and port-town of Sussex, situated on a bay of the English Channel, sixty miles south-east of London. It sends two members to parliament.

RYEGATE, or **REY GATE**. See **REY GATE**.

RYME, or **RHYME**. See **RHYME**.

RYPEN, a city and port-town of Jutland, in Denmark: east long. 9°. north lat. 55° 30'.

RYSAGON, a name given to the castumunar-root. See the article **CASTUMUNAR**.

RYSWICK, a fine village in Holland, between the Hague and Delft, where the peace in 1697 was concluded.

RZECZICA, a city of Lithuania, in Poland, situated on the river Nieper, east long. 30°, north lat. 53°.



S.

S, *s*, or *s*, the eighteenth letter, and fourteenth consonant of our alphabet; the sound of which is formed, by driving the breath through a narrow passage between the palate and the tongue elevated near it, together with a motion of the lower jaw and teeth towards the upper; the lips being a little way open, with such a configuration of every part of the mouth and larynx, as renders the voice somewhat sibilous and hissing. Its sound however varies, being strong in some words, as *this*, *thus*, &c. and lost in words which have a final *e*, as *mus*, *wife*, &c. It is generally doubled at the end of words, whereby they become hard and harsh, as in *kiss*, *loss*, &c. In some words it is silent, as *isle*, *island*, *viscount*, &c. In writing or printing, the long character *s*, is used at the beginning and middle of words, but the short *s*, at the end.

In abbreviations, *S* stands for *societas* or *socius*; as, *R. S. S.* for *regiæ societatis socius*, i. e. fellow of the royal society. In medicinal prescriptions, *S. A.* signifies *secundum artem*, i. e. according to the rules of art; and in the notes of the antients, *S* stands for *Sextus*; *SP.* for *Spurius*; *S C.* for *senatus consultum*; *S. P. Q. R.* for *senatus populusque Romanus*; *S. S. S.* for *stratum super stratum*, i. e. one layer above another alternately; *S. V. B. E. E. Q. V.* for *si vales bene est, ego quoque valeo*, a form used in Cicero's time, in the beginning of letters.

Used as a numeral, *S* antiently denoted seven; in the Italian music, *S* signifies solo; and in books of navigation, *S* stands for south; *S. E.* for south-east; *S. W.* for south-west; *S. S. E.* for south south-east; *S. S. W.* for south south-west, &c. See **COMPASS**.

SABA, one of the Caribbee-islands, subject to the Dutch: west long. 63°, north lat. 18°.

SABÆANS, in church-history, a set of idolaters, much antienter than the Jewish law.

In the early ages of the world, idolatry was divided between two sects; the worshippers of images called *sabæans*, or *sabians*, and the worshippers of fire called *magi*. See the article **MAGI**.

The *sabæans* began with worshipping the heavenly bodies, which they fancied were animated by inferior deities. In the consecration of their images, they used many incantations to draw down into them from the stars those intelligences, for whom they erected them, whose power and influence they held afterwards dwelt in them. This religion, it is said, first began among the Chaldæans, with their knowledge in astronomy; and from this it was, that Abraham separated himself, when he came out of Chaldæa. From the Chaldæans it spread all over the east; and from thence to the Grecians, who propagated it to all the nations of the known world. The remainder of this sect still subsists in the east,

east, and pretend to derive their name from Sabius a son of Seth; and among the books in which the doctrines of this sect are contained, they have one which they call the book of Seth, and which they pretend was written by that patriarch.

SABBATH, or the day of rest, a solemn festival of the Jews, on the seventh day of the week, or Saturday, beginning from sun-set on Friday, to sun-set on Saturday.

The observance of the Sabbath began with the world: for God having employed six days in its creation, appointed the seventh, as a day of rest to be observed by man, in commemoration of that great event. On this day the Jews were commanded to abstain from all labour, and to give rest to their cattle. They were not allowed to go out of the city farther than two thousand cubits, or about a mile; a custom which was founded on the distance of the ark from the tents of the Israelites, in the wilderness, after their leaving Egypt; for being permitted to go, even on the sabbath-day, to the tabernacle to pray, they from thence inferred, that the taking a journey of no greater length, though on a different account, could not be a breach of the sabbatical rest.

As the seventh day was a day of rest to the people, so was the seventh year to the land; it being unlawful in this year to plow or sow, and whatever the earth produced, belonged to the poor; this was called the sabbatical year. The Jews, therefore, were obliged, during the six years, and more especially the last, to lay up a sufficient store for the sabbatical year.

The modern, as well as the ancient, Jews, are very superstitious in the observance of the sabbath; they carry neither arms, nor gold, nor silver about them, and are permitted neither to touch these, nor a candle, nor any thing belonging to the fire; on which account they light up lamps on Friday, which burn till the end of the sabbath.

There is at present a sect of baptists called sabbatarians, from their observing the seventh day of the week, as a day set apart for the worship of God: they attempt to justify this practice by alledging that the Jewish sabbath was never abrogated in the New Testament; and that where God has given a command, it is our duty to observe it till he has ab-

rogated or altered it by a new command. See the article **SUNDAY**.

SABELLIANS, a sect of christians of the III^d. century, that embraced the opinions of Sabellius, a philosopher of Egypt, who openly taught that there is but one person in the Godhead.

The sabellians maintained, that the Word and the Holy Spirit are only virtues, emanations, or functions of the Deity; and held, that he who is in heaven is the father of all things, descended into the virgin, became a child, and was born of her as a son; and that having accomplished the mystery of our salvation, he diffused himself on the apostles in tongues of fire, and was then denominated the Holy Ghost. This they explained by resembling God to the sun, the illuminative virtue or quality of which was the Word, and its warming virtue the Holy Spirit. The Word, they taught, was darted, like a divine ray, to accomplish the work of redemption; and that, being re-ascended to heaven, the influences of the Father were communicated after a like manner to the apostles.

SABINA, **SAVIN**, in botany. See **SAVIN**.

SABINA, a province of Italy, in the pope's territories, bounded by Umbria on the north, by Naples on the east, by the Campania of Rome on the south, and by St. Peter's Patrimony on the west.

SABLE, or **SABLE ANIMAL**, in zoology, the brown mustela with grey ears, very like the common weasel in form, but equal to the polecat in size: the fur of this creature is very thick and deep, and remarkably fine and glossy. It is a native of the northern parts of Europe; and its fur is valued at a very high rate. See **MUSTELA**, and **WEASEL**.

SABLE, in heraldry, denotes the colour black, in coats of arms belonging to gentlemen; but in those of noblemen it is called diamond; and in those of sovereign princes, saturen. See **COLOUR**. It is expressed in engraving by perpendicular and horizontal hatches crossing one another, as represented in pl. CCXXXV. fig. 5.

SABLE-MOUSE, a name given to the Norway rat. See **NORWAY RAT**.

SABLE, in geography, a town of Orleans in France, twenty miles north of Angers.

SABLUSTAN, a province of Persia, which, comprehending Gaur and Candahor, is bounded by Chorassan on the north, by India on the east, and by Sigistian on the south.

SABOT,

SABOT, a kind of wooden shoe, much wore by the peasants in France. See the article **CALIGA**.

SABRE, a kind of sword or scimitar, with a very broad and heavy blade, thick at the back, and a little falcated or crooked towards the point: it is the ordinary weapon worn by the Turks, who are said to be very expert in the use of it.

SABURRÆ, GRITTS, in natural history, a genus of fossils, found in minute masses, forming together a kind of powder, the several particles of which are of no determinate shape, nor have any tendency to the figure of crystal, but seem rudely broken fragments of larger masses; not to be dissolved or disunited by water, but retaining their figure in it, and not cohering by means of it into a mass; considerably opaque, and in many species fermenting with acids; often souled with heterogeneous matters, and not unfrequently taken in the coarser stony and mineral or metalline particles.

Gritts are of various colours, as, 1. The stony and sparry gritts, of a bright or greyish white colour. 2. The red stony gritts. 3. The green stony gritts, composed of homogeneous sparry particles. 4. The yellow gritt, of which there is only one species. 5. The black and blackish gritts, composed of stony or talcy particles.

SAC, in law, is said to be an ancient privilege, which the lord of a manor claims of holding his court, in causes of trespass among his tenants, and imposing fines for the same. See **COURT** and **MANOR**.

SACCADE, in the manege, is a jerk more or less violent, given by the horseman to the horse, in pulling or twitching the reins of the bridle all on a sudden, and with one pull, and that when a horse lies heavy upon the hand, or obstinately arms himself.

This is a correction used to make a horse carry well, but it ought to be used discreetly, and but seldom.

SACCAI, a city and port-town of Japan, situated on the bay of Mecao, three hundred miles south-west of Jeddo: east long. 135°, and north lat. 36°.

SACCHARUM, **SUGAR**, in botany. See the article **SUGAR**.

SACCHARUM SATURNI, **SUGAR OF LEAD**, is thus ordered to be made in the London Dispensatory: boil ceruss with distilled vinegar, until the vinegar becomes sufficiently sweet; then filter the vinegar

through paper, and after due evaporation set it to crystallize.

Some have ventured to give sugar of lead internally, in doses of a few grains, as a styptic, in hæmorrhages, profuse colliquative sweats, seminal fluxes, the fluor albus, &c. and indeed it must be allowed, that it very powerfully restrains the discharge; but then it occasions other symptoms, often dangerous, and sometimes fatal, as violent colic-pains, obstinate constipations, cramps, tremors, &c. so that its internal use seems by no means innocent.

SACculus, in anatomy, a diminutive of *saccus*, signifies a little bag: as 1. The *sacculus lachrymalis*, which is a little bag, into which the puncta lachrymalia of the eye open. 2. The *sacculus cordis*, or pericardium. 3. The *sacculus chyloferus*, the beginning of the thoracic duct, more usually called *receptaculum chyli*. 4. *Sacculi adiposi*, or the adipose cells, &c. See the article **EYE**, **PERICARDIUM**, **RECEPTACULUM**, &c.

A topical application, inclosed in a linen-bag, is also termed *sacculus medicinalis*; as is a bag filled with medicinal simples, and suspended in a liquor, in order to make a diet-drink.

SACCUS JUGULARIS, the **JUGULAR SACK**, in anatomy, a receptacle formed at the termination of the internal jugular vein; the use of which is to bring back the blood from the sinuses of the dura mater, and from the brain. See the article **JUGULAR** and **BRAIN**.

SACER, in its common acceptation, signifies sacred, or holy; but is also used to express dreadful, horrid, or execrable; and in this last sense Virgil calls the love of gold, *auri sacra fames*.

It is used by medical writers in both these significations: thus they call *hiera picra*, the sacred tincture; a malignant kind of erysipelas, *ignis sacer*; and the epilepsy, *morbus sacer*. See **HIERRA-PICRA**, **ERYSIPELAS**, and **EPILEPSY**. Some give the name *sacer musculus* to a muscle called by Winslow *transverso-spinalis lumborum*: it is composed of several small ones, and lies between the spinal and oblique apophyses of the loins, reaching to the *os sacrum*.

SACER, in ornithology, the english name for the blue-legged falcon, with a dusky ferrugineous back. See **FALCO**.

This is a very large but not a very beautiful species of falco; it is of the size of a full

a full grown hen. It is a very swift flier, and so bold that there is scarce any bird it will not seize upon. The head is large and rounded; the beak is short, broad at the base, and hooked at the point; the opening of the mouth is very wide, and the swallow remarkably large; the body is longer, as are also the wings and tail, than in most other species.

SACERDOTAL, something belonging to priests. See the article **PRIEST**.

SACK of wool, a quantity of wool containing just twenty-two stone, and every stone fourteen pounds. In Scotland, a sack is twenty-four stone, each stone containing sixteen pounds.

SACK of cotton-wool, a quantity from one hundred and a half to four hundred weight.

SACKS of earth, in fortification, are canvas-bags filled with earth. They are used in making retrenchments in haste, to place on parapets, or the head of the breaches, &c. to repair them, when beaten down.

SACKBUT, a musical instrument of the wind kind, being a sort of trumpet, though different from the common trumpet both in form and size: it is fit to play a bass, and is contrived to be drawn out or shortened, according to the tone required, whether grave or acute. The Italians call it trombone, and the Latins tuba duclilis.

It takes asunder in four pieces, and has frequently a wreath in the middle, which is the same tube only twice twisted, or making two circles in the middle of the instrument, by which means it is brought down one fourth lower than its natural tone: it has also two pieces or branches on the inside, which do not appear, unless drawn out by an iron-bar, and which lengthens it till it hit the tone required. The sackbut is usually eight feet long, without reckoning the circles, and without being drawn out: when it is extended to its full length, it is usually fifteen feet; the wreath is two feet nine inches in circumference.

There are sackbuts of different sizes, distinguished by the epithets primo or I^o, secundo or II^o, terzo or III^o, &c. or 1^o, 2^o, 3^o, &c.

SACRA, the **SACRED ARTERY**, in anatomy, is a branch of the aorta descendens; which, according to Heister, sometimes descends through the os sacrum to the pelvis; sometimes arises one from each

iliac, and sometimes is altogether wanting. See the article **ARTERY**.

There is also a vein called the vena sacra, which arises from the vena cava, just above the iliacs: it is sometimes double. See the article **VEIN**.

SACRAMENT, *sacramentum*, signifies, in general, a sign of a thing sacred and holy; and is defined to be an outward and visible sign of a spiritual grace. Thus there are two objects in a sacrament, the one the object of the senses, and the other the object of faith. Protestants admit only of two sacraments, baptism and the eucharist, or Lord's supper; but the roman-catholics own seven, viz. baptism, confirmation, the eucharist, penance, extreme unction, ordination and marriage. See the articles **BAPTISM**, **CONFIRMATION**, &c. The romanists, however, by way of eminence, call the eucharist the holy sacrament. Thus to expose the holy sacrament, is to lay the consecrated host on the altar to be adored. The procession of the holy sacrament, is that in which this host is carried about the church, or about a town.

SACRAMENT was also used in the roman law for a pledge in money which both the plaintiff and defendant in a real action laid down in court to be forfeited by him who should lose the cause.

SACRAMENTARIANS, a name given by the romanists to all such as in their opinion entertain erroneous doctrines of the sacrament of the Lord's supper, and chiefly used by way of reproach to lutherans, calvinists, and other protestants.

SACRAMENTARY, an antient romish church-book, which contains all the prayers and ceremonies practised at the celebration of the sacraments.

It was wrote by pope Gelasius, and afterwards revised, corrected, and abridged by St. Gregory.

SACRED, something holy, or that is solemnly offered and consecrated to God, with benedictions, unctions, &c. Thus kings and priests are held sacred persons; the deaconhood, subdeaconhood, and priesthood, are all sacred orders, and impress a sacred indelible character. The sacred college is that of the cardinals.

Sacred is also applied to things belonging to God and the church. Thus churches, church-lands, ornaments, &c. are held sacred. But in the civil law, a sacred place

place chiefly denotes, that where a person deceased has been interred.

Sacred majesty is applied to the emperor and the king of England; though this title has by some been thought blasphemous.

SACRIFICE, a solemn act of religious worship, which consisted in dedicating or offering up something animate or inanimate on an altar, by the hands of the priest, either as an expression of their gratitude to the deity for some signal mercy, or to acknowledge their dependence on him, or to conciliate his favour. The origin of sacrifices is by some ascribed to the Phœnicians, but Porphyry ascribes it to the Egyptians, who first offered the first fruits of their grounds to the gods, burning them upon an altar of turf: thus in the most antient sacrifices there were neither living creatures, nor any thing costly or magnificent: and no myrrh or frankincense. At length they began to burn perfumes: and afterwards men leaving their antient diet of herbs and roots, and beginning to use living creatures for food, they began also to change their sacrifices. The scriptures, however, furnish us with a different account; for Noah, it is said, sacrificed animals at his coming out of the ark; and even Abel himself sacrificed the best and fattest of his flock; but Grotius thinks it more probable that he contented himself with making a mere oblation of his lambs, &c. without slaying them.

The Jews had two sorts of sacrifices, taking the word in its largest signification: The first were offerings of tythes, first-fruits, cakes, wine, oil, honey, and the like; and the last offerings of slaughtered animals. When an Israelite offered a loaf or a cake, the priest broke it in two parts, and setting aside that half which he reserved for himself, broke the other into crumbs, poured oil, wine, incense, and salt upon it, and spread the whole upon the fire of the altar. If these offerings were accompanied with the sacrifice of an animal, they were thrown upon the victim to be consumed along with it. If the offerings were of the ears of new corn, they were parched at the fire, rubbed in the hand, and then offered to the priest in a vessel, over which he poured oil, incense, wine and salt, and then burnt it upon the altar, having first taken as much of it, as of right belonged to himself.

The principal sacrifices among the Hebrews consisted of bullocks, sheep and goats; but doves and turtles were accepted from those who were not able to bring the other; these beasts were to be perfect and without blemish. The rites of sacrificing were various, all of which are very minutely described in the book of Moses.

The manner of sacrificing among the Greeks and Romans was as follows in the choice of the victim, they took care that it was without blemish or imperfection; its tail was not to be too small at the end; the tongue not black nor the ears cleft; and that the bull was one that had never been yoked. The victim being pitched upon, they gilt his forehead and horns, especially if a bullock, heifer, or cow. The head they adorned with a garland of flowers, a woollen insula or holy fillet, whence hung two rows of chaplets with twisted ribbands; and on the middle of the body a kind of stole, pretty large, hung down on each side; the lesser victims were only adorned with garlands and bundles of flowers, together with white tufts or wreaths.

The victims thus prepared were brought before the altar; the lesser being driven to the place, and the greater led by an halter; when if they made any struggle or refused to go, the resistance was taken for an ill omen, and the sacrifice frequently was set aside. The victim thus brought was carefully examined, to see that there was no defect in it: then the priest, clad in his sacerdotal habit, and accompanied with the sacrificers and other attendants, and being washed and purified according to the ceremonies prescribed, turned to the right-hand and went round the altar, sprinkling it with meal and holy-water, and also besprinkling those who were present. Then the cryer proclaimed with a loud voice, Who is here? To which the people replied, Many and good. The priest then having exhorted the people to join with him by saying, Let us pray, confessed his own unworthiness, acknowledging that he had been guilty of divers sins; for which he begged pardon of the gods, hoping that they would be pleased to grant his requests, accept the oblations offered them, and send them all health and happiness; and to this general form added petitions for such particular favours as were then desired. Prayers being

ling ended, the priest took a cup of wine, and having tasted it himself, caused his assistants to do the like; and then poured forth the remainder between the horns of the victim. Then the priest or the cryer, or sometimes the most honourable person in the company, killed the beast, by knocking it down, or cutting its throat. If the sacrifice was in honour of the celestial gods, the throat was turned up towards heaven: but if they sacrificed to the heroes or infernal gods, the victim was killed with its throat towards the ground. If by accident the beast escaped the stroke, leaped up after it; or expired with pain and difficulty, it was thought to be unacceptable to the gods. The beast being killed, the priest inspected its intrails, and made predictions from them. They then poured wine, together with frankincense, into the fire, to increase the flame, and then laid the sacrifice on the altar; which in the primitive times was burnt whole to the gods, and thence called an holocaust; but in after times, only part of the victim was consumed in the fire, and the remainder reserved for the sacrificers; the thighs and sometimes the entrails being burnt to their honour, the company feasted upon the rest. While the sacrifice was burning, the priest, and the person who gave the sacrifice, jointly prayed, laying their hands upon the altar. Sometimes they played upon musical instruments in the time of the sacrifice, and on some occasions they danced round the altar, singing sacred hymns in honour of the gods.

SACRIFICE is also the name of an island in the gulph of Mexico, forty-five miles east of La Vera Cruz: it is subject to the Spaniards.

SACRILEGE, the crime of profaning sacred things, or those devoted to the service of God.

SACRISTAN, *sacrista*, a church officer, otherwise called sexton. See **SEXTON**.

SACRISTY, *sacristia*, in church history, an apartment in a church, where the sacred utensils were kept; being the same with our vestry. See **VESTRY**.

SACRO-LUMBARIS, in anatomy, one of the extensor muscles of the back and loins, has its origin in the os sacrum and the posterior spine of the ilium, and its termination in the upper part of the ribs.

SACRUM OS, the sacred bone, in anatomy, the lower extremity of the spinal axis, being a bone of a triangular figure,

with a rough surface; its substance is spongy, and it has two lateral apophyses, for its articulation with the ossa innominata; also two smaller upper apophyses, with glenoid cavities for the articulation into the lower vertebra; and an inferior apophyses, for its articulation with the os coccygis: it has also a canal, for the end of the spinal marrow.

The uses of this bone are, 1. To serve as a basis to the spine. 2. To form the pelvis along with the ossa innominata, and to defend the parts contained in it.

3. To contain in its sinus the lower part of the spinal marrow, called cauda equina.

4. To give passage at its foramina, which are sometimes four sometimes five pair, to the nerves of the intestinum rectum, the bladder, and of the parts of generation, and to the large crural and iliacatic ones. 5. To serve as a place of origin to many of the muscles.

In adults, the os sacrum is one continued bone; but, in infants, it is almost entirely cartilaginous; and in children more grown up, it always consists of several pieces, the junctures of four or five of which may be seen even in adults.

SADERASAPATAN, a port-town of the coast of Cormandel forty miles south of Fort St. George. Here the Dutch have a factory.

SADDLE, is a seat upon a horse's back, contrived for the conveniency of the rider.

A hunting-saddle is composed of two bows, two bands, fore-bolsters, pannels, and saddle-straps; and the great saddle has, besides these parts, corks, hind-bolsters, and a trouff-quin.

The pommel is common to both.

A horseman that would sit a horse well, ought always to sit on his twist, and never on his buttocks, which ought never to touch the saddle; and whatever disorder the horse commits, he ought never to move above the saddle.

The antient Romans are supposed not to have made use of saddles and stirrups, and it is thought that they did not come into use till the time of Constantine the Great, A. C. 340, as appears from the greek historian, Zonaras, who (through his whole history) makes no mention of a saddle for a horse, before such time as Constantine attempted to deprive his brother Constantine of the empire, made head against his army, and entering into the squadron where he himself was, cast him beside the saddle of his horse. The several

sorts of saddles in use at present are. 1. The running-saddle; which is a small one with round skirts. 2. The Burford-saddle; which hath the seat and the skirts both plain. 3. The pad-saddle; of which there are two sorts, some made with burs before the seat, and others with bolsters under the thighs. 4. A french pad-saddle; of which the burs come wholly round the seat. 5. The portmanteau-saddle, that has a cantle behind the seat, to keep the portmanteau or other carriage off from the back of the rider. 6. A war-saddle; which has a cantle and a bolster behind and before; also a fair bolster. 7. The pack-saddle. As for the several parts of a saddle, and the description of them, they are to be found under their several heads. See the articles *BOWS of a saddle*, *WHITHERS*, *STRAPS*, *BOLSTERS of a saddle*, &c.

SADDLE-GALLED, in farriery. See the article *GALLING*.

SADDUCEES, in jewish antiquity, a famous sect among the antient Jews, so called from their founder Sadoc Antigonus of Socho, president of the sanhedrim at Jerusalem, and teacher of the law in the principal divinity-school of that city. Having often, in his lectures, asserted to his scholars, that they ought not to serve God in a servile manner, with respect to reward, but only out of filial love and fear; two of his scholars, Sadoc and Baithus, inferred from thence, that there were no rewards or punishments after this life: and, therefore, separating from the school of their master, they taught that there was no resurrection, nor future state. Many, embracing this opinion, gave rise to the sect of the sadducees, who were a kind of epicureans, but differing from them in this, that though they denied a future state, yet they allowed the world was created by the power of God, and governed by his providence; whereas the followers of Epicurus denied both.

The Sadducees denied all manner of predestination whatever, and not only rejected all unwritten traditions, but also all the books of the Old Testament, excepting the pentateuch. See the article *PENTATEUCH*.

SAFE-CONDUCT, a security given by the king under the great seal to a foreigner, for his safe coming into and passing out of the kingdom.

SAFE GUARD, a protection formerly granted to a stranger, who feared violence

from some of the king's subjects, for seeking his right by course of law.

SAFFRON, *crocus*, in botany, &c. See the article *CROCUS*.

Saffron is cultivated in fields for use, and is no where raised with so much success as in England, the english saffron being generally allowed to be greatly superior to any other. The usual way of propagating it is by the bulbs, of which it annually produces new ones. These are planted out in trenches at five inches distance, or less, and they seldom fail. They produce only leaves the first year, but in September, or October, of the year following, they flower. The saffron is gathered as soon as the flowers open, and is then separated from all filth, and formed into cakes, by a very careful pressure and gentle heat. At the end of October, when the flowering season is over, the bulbs are taken out of the ground, and hung up in a dry place, and in spring are put into the ground again.

It is not, however, the entire flower of the plant that produces it, but only some of its internal parts. It is met with in the shops in flat and thin cakes, into which it has been formed by pressing, and which consist of many long and narrow filaments, that are smallest in their lower part, where they are of a pale yellow colour; in their upper part they are broader and indented at their edges, and of a very strong and deep orange colour, approaching to redness. They are somewhat tough, moderately heavy, very easily cut, of an acrid, penetrating, but not unpleasant smell, somewhat affecting the head, and of a bitterish and hot, but highly cordial taste. Thrown into water, they almost instantaneously give it a strong yellow or reddish colour, according to the quantity used. These filaments are the cristated capillaments, into which the pistil of the flower divides at its head; they are of a deep reddish orange-colour, while growing, and there are only three of them in each flower. Saffron is to be chosen fresh, tough, flexible, difficult to be broken, of a strong smell, and very bitter taste, and such as stains the hands.

Saffron is in many places in great esteem in sauces, and on many occasions in foods; but its great use is in medicine, and indeed with us its sole use. It is a high cordial, and a very powerful aperient, detergent, and resolvent. It is of almost immediate relief against faintings and

and palpitations of the heart; it also strengthens the stomach, and assists digestion. It is of great use in disorders of the breast arising from the lungs being loaded with a tough phlegm; and it softens the irritating acrimony of a vitiated serum on those parts, and by this means is often of great use against inveterate coughs: wherefore, it is called *anima pulmonum*. It opens obstructions in the viscera, and particularly in the liver; it cures jaundices, and promotes the menses. It is also anodyne, and occasionally serves as a paregoric; it is very happily joined with opium in the laudanum of Sydenham, and in many other preparations in which that medicine has a principal share.

Yet, notwithstanding all these virtues, saffron improperly administered may do great harm: women with child, and those who have profluvia of the menses, are never to meddle with it. It has an ebriating faculty, and when taken in immoderate doses, may bring on dreadful head-achs, long sleep, convulsions, and even death. The very smell of it affects the head greatly; its effluvia affect the eyes also, and give them great pain; and we have an account, in Borelli, of a druggist's servant who died by the effect of a large parcel of saffron lying near his bed. Convulsive laughter is no uncommon effect of an immoderate dose of saffron, and there are not wanting instances of people who have died in that state: the very external use of saffron is also to be dreaded on some occasions; the oxycroceum plaster, of which it is an ingredient, must by no means be applied in cases where inflammation is feared; for it often occasions one.

The common dose of saffron in substance, with us, is from five grains to ten, but we are told of much greater quantities given by many people.

Saffron, distilled in a retort, first yields a small quantity of a fine volatile acid spirit; after this a subacid phlegm, then a small quantity of an essential oil, with a mixture of a volatile urinous salt; and by lixiviation of the residuum, a pure alkaline salt may be obtained.

The preparations of saffron, in use in our shops, are the tincture and the syrup. The tincture may be extracted equally well, by means of water, and of spirits of wine. Its dose is from thirty drops to a drachm, or more; it is good in all

cases where the saffron in substance is so. If wine be used instead of spirit, it is called *vinum crocatum*.

Syrup of saffron is thus prepared: take of fine saffron, an ounce; cut it small, and put it into a pint of mountain-wine to infuse; let it stand three days without heat; then straining off the wine, filter it to render it perfectly clear, and add to it twenty-five ounces of doubly refined sugar; melt the sugar over a gentle fire, and set it by for use.

SAFFRON, *crocus*, is also a name given to several chemical preparations, from their resembling the vegetable saffron in colour. See the article CROCUS.

Meadow-SAFFRON, *colchicum*, in botany, &c. See the article COLCHICUM.

SAFFRON WALDEN. See WALDEN.

SAGAN, a town of Silesia, situated on the river Bober, fifty-six miles north-west of Breslaw.

SAGAPENUM, in pharmacy, &c. a gum-resin, brought to us in two forms; the finer and purer is in loose granules, or single drops; the coarser kind is in masses composed of these drops of various sizes, cemented together by a matter of the same kind. In either case it is of a firm and compact substance, considerably heavy, and of a reddish colour on the outside, brownish within, and spotted in many places with small yellowish or whitish specks. Its smell is strong and disagreeable; its taste acrid and unpleasant.

It is brought to us from Persia and the East-Indies. The plant which produces it has never been described, but is supposed to be, as Dioscorides says, of the ferula-kind, from the seeds and fragments of the stalks sometimes met with in the body of it.

Sagapenum is a very great attenuant, aperient, and discutient; it is good in all disorders of the breast that owe their origin to a tough phlegm. It has also been found to discuss tumours in the nervous parts, in a remarkable manner, and to give relief in habitual head-achs, where almost all things else have failed. Its dose is from ten grains to two scruples, but it is now seldom given alone. It has been found, however, to do great things in asthmas, in obstructions of the viscera, particularly the spleen, in nervous complaints, and even in epilepsies. It also promotes the menses, and expels the secundines; and is an ingredient in the

theriaca, mithridate, and many other of the shop-compositions.

SAGATHEE, in commerce, a slight kind of woollen stuff, serge, or ratteen, sometimes mixed with a little silk.

SAGE, *salvia*, in botany, a genus of the diandria monogynia class of plants, with a monopetalous tubular flower, labiated at the mouth: there is properly no fruit, the seeds, which are four in number, and roundish, being contained in the bottom of the cup.

The common red sage has always been esteemed as a cephalic and sudorific. An infusion of it, made in the manner of tea, has been long famous, as the common drink of people in fevers. It is attenuant and diuretic; it promotes the menses, and is good in vertigoes, tremors, palsies, and in catarrhs. The virtues and uses of the sage of virtue, are the same with the other. Its name, indeed, has made many prefer it to the common sage for the making tea for people in fevers; but the more agreeable flavour of the common kind, and the pleasant colour of the infusion, when a little lemon-juice is added, have again of late restored it into general use.

SAGENE, a russian long measure, five hundred of which make a werst: the sagene is equal to seven english feet.

SAGINA, in botany, a genus of the tetrandria-tetragynia class of plants, the flower of which consists of four oval, obtuse, and patent petals, shorter than the cup: the fruit is an oval quadrilocular capsule, consisting of four valves, and containing numerous very small seeds, affixed to the receptacle.

SAGITTA, in astronomy, the arrow, or dart, a constellation of the northern hemisphere, near the eagle; consisting of five stars, according to Ptolemy and Tycho; but in Mr. Flamsteed's catalogue, of no less than twenty-three.

SAGITTA, in botany, implies the top of any small twig, cyon, or graft of a tree.

SAGITTA, in trigonometry, the same with the versed sine of an arch.

SAGITTAL future, in anatomy, the second of the genuine futures of the cranium or skull. See the article **SKULL**.

SAGITTARIA, or **SACITTA**, **WATER ARROW-HEAD**, in botany, a genus of the monoecia-polyandria class of plants, the male corolla whereof consists of three roundish, obtuse, plane, patent petals, thrice longer than the cup: the female

corolla is like that of the male one; there is no pericarpium; the receptacle, which is globose, collects the seeds into a globe: the seeds are numerous, compressed, and surrounded longitudinally with a broad membranaceous margin.

SAGITTARIUS, the **ARCHER**, in astronomy, the ninth sign of the zodiac. See the article **ZODIAC**.

The stars in this constellation in Ptolemy's catalogue are thirty-two, in Tycho's sixteen, and in Mr. Flamsteed's fifty-two.

SAGO, a simple brought from the East-Indies, of considerable use in diet as a restorative.

Sago is a sort of bread produced in the following manner, from a tree called landan, growing in the Moluccos. When a tree is felled, they cleave it in two in the middle, and dig out the pith, which is eatable, when it comes fresh out of the tree. They pound it in a mortar, till it is reduced into a kind of powder somewhat like meal. Then they put in a sieve made of the bark of the same tree, placing it over a cistern made of its leaves, and pour water on it, which separates the pure part of the powder from the woody fibres wherewith the pith abounds. The flour thus filtrated they call sagu, which they make into paste, and bake it in earthen furnaces.

SAGREE, in ichthyology, a species of the squalus with no pinna ani, and with the nostrils at the extremity of the rostrum. See the article **SQUALUS**.

This species grows to about five feet in length, the head is large and depressed, the rostrum is subacute, and the nostrils are situated at its extremity, each having two apertures.

SAICK, or **SAIQUE**, a turkish vessel, very common in the Levant for carrying of merchandize.

SAIL, in navigation, an assemblage of several breadths of canvas, sewed together by the lifts, and edged round with a cord, fastened to the yards of a ship, to make it drive before the wind. See the article **SHIP**.

Every yard in a ship has its proper sail, except the cross-jack, which takes its name from the yard: and those which are not bent to the yard, are the flying jibb, fore, foretop, main, maintop, maintop-gallant, mizen, mizentop-mast, stay-sails, main and maintop fudding-sails. See the article **SHIP**.



AILS also denote the vanes of wind-mills.

See the article **WIND-MILL**.

AILS, in falconry, a term for the wings of a hawk. See the article **HAWK**.

AILING, properly denotes the art of navigating and working a ship, or of causing her to observe such motions and directions as are assigned by the navigator; in which sense, sailing differs from navigation, and must be learned by practice on shipboard. See **NAVIGATION**.

The most advantageous position of the sails and rudder of a ship, has been already treated of under the article **MAXIMUM**.

And that their action may be reduced to the principles of the lever, has been shewn under the article **LEVER**.

The resistance too which the ship meets with from the water, has been considered under the article **RESISTANCE**.

SAILING also denotes a particular method of navigation; in which sense we say, Mercator's sailing, plane sailing, parallel sailing, middle latitude sailing, and great circle sailing: all which, except the last, have been already explained under the article **NAVIGATION**.

Great circle-SAILING, in navigation, the art of finding what places a ship must go through, and what courses to steer; so that her tract shall be in the arch of a great circle, or nearly so, passing through the place sailed from and that bound to.

It is chiefly on account of the shortest distance, that this method of sailing has been proposed; for in the sphere, it is well known that the shortest distance between two places is the arch of a great circle intercepted between them, and not in the rhumb or spiral passing through those places. See the article **RHUMB**.

As, in Mercator's sailing, the several cases were solved by plane triangles; so the solution of the cases of great circle-sailing is obtained by means of spherical triangles: and, therefore, the navigator should be master of spherical trigonometry, before he attempts this method. See the article **TRIGONOMETRY**.

A great variety of cases might be proposed in this kind of sailing; but as many of them may serve rather for exercises in the solution of spherical triangles, than for any real use towards the navigating of a ship, we shall only consider those appertaining to the following problems, *viz.*

Prob. I. The latitudes and longitudes of two places on the earth being given, re-

quired their nearest distance on the surface, together with the angles of position from either place to the other. This problem may be branched out into the six following cases.

Case I. When the two places lie under the same meridian, their difference of latitude will give their distance, and the position of one from the other will be directly north or south.

Case II. When the two places lie under the equator, their distance is equal to their difference of longitude; and the angle of position, with respect to the meridian of either, is a right angle, or the course from one to the other is due east west.

Case III. When both places are in the same parallel of latitude.

Example. What is the shortest distance between St. Mary's, in N. lat. 37° , and W. long. $22^{\circ} 56'$; and Cape Henry, in N. lat. 37° , and W. long. $76^{\circ} 23'$?

Let **PESQ** (plate **CCXXXVI**, fig. 1. n^o 1.) represent the meridian of St. Mary's, **ABa** the parallel of 37° N. lat. and **PBCS** the meridian of Cape Henry; then will the point **A** be St. Mary's, and the point **B** Cape Henry: draw the diameter **AD**, and through the points **A**, **B**, **D**, describe the great circle **ABD**; then is the arch **AB** the shortest distance, the angle **PAB** the angle of position from **A** to **B**; and the angle **PBA** the angle of position from **B** to **A**; and the angle **APB**, which is measured by the arch **QC**, is the difference of longitude. Now as the places have both the same latitude, therefore **PA = PB**, and **LPA = LPBA**; and if **PI** be described making **LAPI = LBPI = $26^{\circ} 43' \frac{1}{2}$** , then will **PI** bisect **AB**, and be perpendicular to it in **I**. And in the triangle **AIP**, right-angled at **I**, there will be given the hypotenuse **AP = 53°** , and the angle **API = $26^{\circ} 43' \frac{1}{2}$** ; whence to find the leg **AI = $21^{\circ} 3' \frac{1}{2}$** ; which doubled gives $42^{\circ} 6'$ for the shortest distance **AB = 2526** nautical miles, which is 35 miles less than 2561, the nautical miles found by parallel sailing.

To find the angle of position **PAB**, we have this analogy, *viz.* Radius = 90° : co-sine of hypotenuse, **PA = 53°** : tangent of **LAPI = $26^{\circ} 43' \frac{1}{2}$** : co-tangent of **LPA B**, or angle of position = $73^{\circ} 9'$.

Hence

Hence it appears, that to sail from A to B, or from B to A, the ship must first steer, N. $73^{\circ} 9'$ west or east; and then gradually increase her course till I, where it will be due west or east; and from thence the course is to be gradually diminished again till she comes to the other port, where it will be $73^{\circ} 9'$, the same as she sets out with: but how these courses are to be altered will be shewn hereafter.

Case IV. When one place has latitude, and the other has none, or is under the equator.

Example. What is the nearest distance between the island of St. Thomas, under the equator, and east long. 1° , and port St. Julian in south lat. $48^{\circ} 51'$, and west long. $65^{\circ} 10'$?

Let the point A (*ibid.* n^o 2.) represent St. Thomas, and the point B port St. Julian; then is AB, an arch of a great circle passing through A and B, the nearest distance; which may be found by this analogy, *viz.* Radius = 90° : co-sine of difference of long. = AC = $66^{\circ} 10'$:: co-sine of difference of latitude CB = $48^{\circ} 51'$: co-sine of the distance AB = $74^{\circ} 35'$. So that the distance AB = $74^{\circ} 35'$ = 4475 miles; which is less, by fifty-seven miles, than the distance found by Mercator's sailing.

For finding the angle of position at A, the proportion is R = 90° : sine AC = $66^{\circ} 10'$:: co-tangent CB = $48^{\circ} 51'$: co-tangent of \angle SAB = $51^{\circ} 22'$. And the angle of position at B may be found by this analogy, *viz.* R = 90° : sine CB = $48^{\circ} 51'$:: co-tangent AC = $66^{\circ} 10'$: co-tangent \angle B = $71^{\circ} 36'$.

Case V. When the latitude of the given places are either both north or both south.

Example. What is the nearest distance between the Lizard in north lat. $49^{\circ} 57'$, and west long. $5^{\circ} 14'$, and the island of Bermudas, in north lat. $32^{\circ} 25'$, and west longitude $66^{\circ} 38'$?

Let SAPQ (*ibid.* n^o 3.) represent the meridian of Bermudas; make PA = $57^{\circ} 35'$ = the co-latitude of Bermudas; and Pa = $40^{\circ} 3'$ = co-latitude of the Lizard; and, with the tangent of Pa, describe the arch aa: also, with the secant of $61^{\circ} 24'$ = difference of long. arcs described from P and S, give the center of the circle, PCS, the meridian of the Lizard; and its intersection with aa gives B the place of the Lizard. Lastly, a great circle being described through the points ABD, the intercepted arch AB is the nearest distance

between the two places; and the angles PAB, PBA, are the angles of position. In the oblique spheric triangle APB, given PA = $57^{\circ} 35'$, PB = PA = $40^{\circ} 3'$, and \angle APB = difference of long. $61^{\circ} 24'$. Hence, to find the distance AB we have this analogy, *viz.* rad. : co-sine \angle APB :: tang. AP : tang. of a fourth arc = $37^{\circ} 1'$ = M; which taken from the co-latitude of the Lizard, leaves a fifth arc = $3^{\circ} 2'$ = N. Then, co-sine M : co-sine N :: co-sine PA : co-sine of the distance AB = $47^{\circ} 54'$.

To find the angle of position PBA, the proportion is, sine of N : sine of M :: tangent \angle APB : tangent \angle PBA = $81^{\circ} 15'$. And the angle of position, PAB may be found by the proportion between opposite sides and angles, *viz.* sine PA : sine of \angle PBA :: sine of PB : sine of \angle PAB = $49^{\circ} 35'$.

Hence it appears that the shortest distance between the Lizard and Bermudas, $47^{\circ} 54'$ = 2874 nautical miles; which is 178 miles less than the distance found by Mercator's sailing. And a ship, in order to run this shortest tract, must sail from the Lizard S. $87^{\circ} 15'$ W. and gradually lessen the course, so as to arrive at Bermudas on the rhumb bearing S. $49^{\circ} 35'$ W. whereas the direct course from one place to the other, as found by Mercator's sailing, is S. $69^{\circ} 2'$ W.

Case VI. When one of the given places has north latitude, and the other south latitude.

Example. What is the nearest distance from the island of St. Helena to the island of Bermudas; the former lying in S. lat. 16° , and W. long. $6^{\circ} 15'$; and the latter in N. lat. $32^{\circ} 25'$, and W. long. $66^{\circ} 38'$?

Let SEPQA (*ibid.* n^o 4.) be the meridian of St. Helena, the point A St. Helena, and the point B Bermudas; then we have given PA = 106° = lat. of St. Helena + 90° , PB = co-latitude of Bermudas = $57^{\circ} 35'$, and \angle APB = difference of longitude = $60^{\circ} 23'$. Therefore, in the oblique spheric triangle ABP, we have the following proportions for finding the distance AB, *viz.* rad. : co-sine difference of long. = \angle APB :: tangent co-latitude of Bermudas = PB : tangent of a fourth arc M = $37^{\circ} 54'$; which taken from 106° leaves a fifth arc N = $68^{\circ} 6'$. And co-sine of M : co-sine of N :: co-sine of PB : co-sine of the distance AB = $75^{\circ} 19'$.

Next to find the angle of position PAB, the

the fourth and fifth arcs being found before, we have this proportion, *viz.* fine of N : fine of M :: tangent A P B : tangent of P A B = $49^{\circ} 20'$. And to find the angle of position P B A, the proportion is as rad. : co-fine L P : tangent P A : tangent of a fourth arc M = $59^{\circ} 53'$. But this fourth arc must be like P A, or obtuse; and therefore the supplement of $59^{\circ} 53'$, or $120^{\circ} 7'$, is the fourth arc M. Then, as fine of N : fine of M :: tangent L P : tangent of L P B A = $59^{\circ} 45'$; but this angle ought to be obtuse, and therefore we must take the supplement to it, *viz.* $120^{\circ} 15'$.

So that was a ship to sail from St. Helena to Bermudas, on the arc of a great circle, the must first shape her course N. $49^{\circ} 20'$ W. and gradually deflect from the north, so as to arrive at Bermudas on a course N. $59^{\circ} 45'$ W. after having run $75^{\circ} 19'$, or 4519 nautical miles. The course found by Mercator's sailing is N. $50^{\circ} 5'$ W. and the distance is 4527 sea miles; whereby it appears, that when the places are one in N. latitude, and the other in S. latitude, there is but a small difference between the results found by Mercator's and great circle sailing, because the rhumb lines near the equator do not greatly differ from great circles.

From the solutions of the foregoing cases it is plain, that to sail in a great circle the ship must continually alter her course: but as this is a difficulty too great to be admitted into the practice of navigation, therefore it has been thought sufficiently exact to effect this business by a kind of approximation; that is, by a method which nearly approaches the sailing on a great circle: for in small arcs the difference between the arc and its chord, or tangent, is so small that they may be taken one for the other in any nautical operations. Upon this principle the great circles on the earth are supposed to be made up of short lines, each of which is a segment of a rhumb line; and on

this supposition the solution of the following problem is deduced.

Prob. II. Having given the latitudes and longitudes of the places sailed from and bound to; to find the successive latitudes in the arc of a great circle, in those places, where alterations in longitude shall be a given quantity; together with the courses and distances between those places.

Solution. 1. Find the angle of position at each place, and their nearest distance, by one of the cases of prob. I.

2. Find the greatest latitude the great circle runs through; that is, find the perpendicular from the pole to that circle; and also find the several angles at the pole, made by the given alterations of longitude between this perpendicular and the successive meridians come to.

With this perpendicular and the polar angles, severally, find as many corresponding latitudes, by saying, as radius : tangent of greatest latitude

:: co-fine of 1st. polar L : tang. 1st. lat.

:: co-fine of 2d. polar L : tang. 2d. lat.

&c.

&c.

4. Having thus found the several latitudes passed through, and the difference of longitude between each, find by Mercator's sailing the courses and distances between those latitudes: - and these are the several courses and distances the ship must run to keep nearly on the arc of a great circle.

Now the smaller the alterations in longitude are taken, the nearer will this method approach the truth: but the usual way is to compute to every five degrees of difference of longitude, the length of the arc of five degrees, differing from its chord, or tangent, only by 0,0002.

If the results of the several operations, for instance of the example of case III. prob. I. wrought by this method, be entered in such a table as the following, it will be found of convenience to the operator.

Polar angles (<i>ibid.</i> n° 5)	Success. longs.	Success. lats.	Diff. long.	Diff. lat.	Merid. parts.	Merid. diff. lat.	Courses.	Di- stances.
LIPB = $26^{\circ} 43' \frac{1}{2}$	$22^{\circ} 56'$	$37^{\circ} 00'$			2392.6			
LIPa = $21^{\circ} 43' \frac{1}{2}$	$27^{\circ} 56'$	$38^{\circ} 05'$	300	65	2474.6	82.0	$74^{\circ} 43'$	246.6
LIPb = $16^{\circ} 43' \frac{1}{2}$	$32^{\circ} 56'$	$38^{\circ} 56'$	300	51	2539.8	65.2	$77^{\circ} 44'$	240.0
LIPc = $11^{\circ} 43' \frac{1}{2}$	$37^{\circ} 56'$	$39^{\circ} 33'$	300	37	2587.6	47.8	$80^{\circ} 57'$	235.2
LIPd = $6^{\circ} 43' \frac{1}{2}$	$42^{\circ} 56'$	$39^{\circ} 57'$	300	24	2618.8	31.2	$84^{\circ} 04'$	232.2
	$49^{\circ} 59' \frac{1}{2}$	$40^{\circ} 09'$	403.5	12	2614.5	15.7	$87^{\circ} 46'$	207.0

1261.9

Hence

Hence it appears that the ship must first sail N. $74^{\circ} 43'$ W. the distance of 246.6 nautical miles; against which time she will have changed her latitude and longitude, &c. as expressed in the respective columns standing in a line with the above course and distance. Her second course will be N. $77^{\circ} 44'$ W. the distance 240 nautical miles; and the other particulars as expressed in the same line under their several columns. Now the column of distances, being summed up, amounts to 1261.9; which being doubled, gives 2523.8 nautical miles for the distance between St. Mary's and Cape Henry; differing only from 2526, the distance found by prob. I. case III. by 2.2. miles.

The tract of a ship, when thus directed nearly in the arc of a great circle, may be delineated on the Mercator's chart, by marking thereon, by the help of latitudes and longitudes, the successive places where the ship is to alter her course: then those places, or points, being joined by right lines, will shew the path along which the ship is to sail, under the proposed circumstances.

SAILORS, the elder seamen, who are employed in working or managing the sails, the tackle, steering, &c. See the articles *NAVAL affairs*, *SEAMEN*, &c.

SAINT, in the romish church, a holy person deceased, and since his decease canonized by the pope, after several informations and ceremonies. See *CANONIZATION*, *BEATIFICATION*, &c.

One of the points wherein the roman catholics and protestants differ is, that the former address, invoke, and supplicate saints, &c. to intercede for them; whereas the latter hold it sufficient to propose their good examples for our imitation. The number of saints, allowed as such in the romish church, is prodigious. Father Papebroche reckons seventeen or eighteen to have died on the first of June only. Father Mabillon, in an express dissertation on the worship of unknown saints, observes, that honours are given to saints who perhaps were not christians, and whose very names were never known: hence, being under a necessity of giving them names, they are therefore called baptized saints. He adds, that they every day beseech saints to intercede for them with God, when it is a matter of doubt whether they themselves be in heaven.

SAINT-POIN, in botany, a species of the he-

dyarum. See the article *HEDYSARUM*. For the use of this plant in feeding cattle see *HAY* and *GRASS*.

SAINTES, a city of France, in the province of Guienne, capital of the territory of Saintogne, situated on the river Charente, in west long. $36'$, north $45^{\circ} 50'$.

SAKER, a small sort of cannon, where there are three species, extraordinary, ordinary, and middle sized. See the article *CANNON*.

SAL, in chemistry, &c. See *SALT*.

For the preparations and uses of sal armoniacum, sal anatron, sal Glauberi, sal-prunellæ, sal-tartari, sal-polycrystum, sal-gemmæ, sal-volatile, &c. See the article *ARMONIA*, *ANATRON*, *GLAUBER'S SALT*, *SAL-PRUNELLÆ*, &c.

SAL CIRCULATUM, in chemistry, a term used by Paracelsus for a preparation of sea-salt, of which he distinguishes two kinds, under the name of the *circulatum minus*, and the *circulatum majus*. They seem to have a great affinity with the famous alkahest, or universal solvent, much talked of in the works of this author and his successor Van Helmont. See the article *ALKAHEST*.

SAL, one of the islands of cape Verd, situated in the Atlantic-ocean: west longitude 23° , lat. 17° .

SALA, a river of Germany, which rises in Franconia and running north, enters Saxony and falls into the Elbe below Dessau.

SALA, a town of Sweden, in the province of Westmania, situated thirty miles west of Upsal.

SALACIA, in zoology, a genus of the gymnarthria, or those insects which have soft and naked bodies furnished with limbs.

The body of the salacia is of an oval oblong form, and the tentacula are numerous and disposed in little clusters. There are two species of the salacia, the one with an undulated surface, about an inch and three quarters in length, and its thickness about an inch: it is largest at the naked extremity, where it terminates in a rounded but not very thick end. The other is the smooth and oblong salacia, of about two inches and a half long, and an inch and a half in diameter.

SALAMANCA, a city of Spain in the province of Leon, situated on the river Tormes: west long. $6^{\circ} 10'$, north latitude 41° .

SALA

SALAMANCA is also a city of Mexico, in North-America, in the province of Yucatan, situated near the gulph of Honduras: west long. 93° , north lat. $17^{\circ} 15'$.

SALAMANDER, *salamandra*, in zoology, a name given by authors to several species of the lizard kind; but the principal are two, the *salamandra aquatica*, the water-newt, and the *salamandra terrestris*. See **LACERTA** and **NEWT**.

The *salamandra aquatica* is the two-edged-tailed lizard, with four toes on the anterior, and five on the hinder, feet. It grows to about four inches in length, and to the thickness of a man's finger: the back is of a deep shining brown; the belly of a bright and glossy yellow. The *salamandra terrestris*, or land salamander, is a species of lizard, the tail of which is short, and its colour of a fine black, marked with red spots of a bright and shining glossy appearance.

SALAMANDER'S BLOOD, among chemists, denotes the redness remaining in the receiver after distilling the spirit of nitre. See the article **NITRE**.

SALAMIS, an island in the gulph of Engia, in european Turkey, situated in east long. 34° , north lat. $37^{\circ} 32'$, being about fifty miles in circumference.

SALANKAMEN, a town of Slavonia, situated on the Danube, twenty miles north-west of Belgrade.

SALARY, *salarium*, a recompence made to a person for his pains or industry about another person's business, as in the case of officers, &c. And it is generally taken for any wages, stipend, or allowance.

SALE, in general, signifies the transferring the property of goods from one to another, upon some valuable consideration, as where in a bargain one agrees to give another a certain sum of money for such goods, and thereupon gives the seller earnest, which he accepts; this is a perfect sale, and shall bind the buyer and seller.

A person may at any time sell his goods or chattels, even though he fears and knows of an execution against him for debt, unless there be a private truit between the parties, and the writ of execution is delivered to the sheriff, &c. And it is held that upon the sale of a horse, or other beast, it may not only be detained till the same is paid for, but if such horse, &c. happens to die, after

being sold, and before delivery, the seller may have an action for the money agreed, the property being in the buyer. See **BARGAIN**, **EARNEST**, &c.

Where a person affirms a particular thing sold to be of a certain value, and at the same time it is not, for this no action lies; but if he actually warrants the same, and this be not the case after sale, it will bear an action, as being part of the agreement. As to the sale of goods in fairs and markets, see the articles **FAIR** and **MARKET**.

SALEM, a port town of New-England, a little north of Boston.

SALEP, in the materia medica, the root of a species of orchis. See **ORCHIS**.

Salep should be chosen clean, firm and hard: it is very little liable either to decay or sophistication. The people of the East-Indies look upon salep to be one of the greatest restoratives and provocatives to ventry in the whole vegetable world. The salep differs very little from the common orchis in virtue. Its appearance is owing to the manner of preparing it, and consequently this may be done from the roots of orchis of our own growth. To prepare these in imitation of salep, Mr. Geoffroy chose the largest, fairest, and plumpest roots he could find: these he nicely skinned; then throwing them into cold water he suffered them to macerate there for some time: after this he lightly boiled them, and then taking them out of the water and draining them, he had them strung upon threads to be dried in a warm dry air: when the roots were thoroughly dried they were very transparent, and resembled pieces of tragacanth, and continued dry and hard. The roots thus prepared may be reduced to powder, which will dissolve away in boiling water, and a scruple of it will make a basin full of jelly, in the manner of the turkish salep. This jelly is an admirable medicine in all cases in which salep is prescribed; and the powder may be given with great success in asses-milk for diseases of the breast. The salep which we receive from Turkey is always a transparent root, of a whitish or reddish colour, according to its different age, and is chiefly recommended in consumptions, bilious dysenteries and disorders of the breast proceeding from an acrimony of the juices.

SALERNO, a city and port-town of Italy, in the kingdom of Naples, and the
16 M hither

hither principat, situated on a bay of the tuscan-Sea: east long. $15^{\circ} 20'$, north lat. $40^{\circ} 40'$.

SALET, SALLET, or SALADE, in war, a light covering or armour for the head, antiently worn by the light horse, only differing from the cask in that it had no crest, and was little more than a bare cap.

SALIENT, in fortification, denotes projecting. There are two kinds of angles, the one salient, which are those that present their point outwards; the other re-entering, which have their points inwards. Instances of both kinds we have in tenailles and star-works. See the article **ANGLE**, &c.

SALIENT, SALIENT, or SAILLANT, in heraldry, is applied to a lion, or other beast, when its fore-legs are raised in a leaping posture. See plate CCXXXVI. fig. 2.

A lion salient is that which is erected bend-ways, standing so as that his right fore foot is the dexter chief point, and his hinder left foot is the sinister base point of the escutcheon, by which it is distinguished from rampant. See the article **RAMPANT**.

SALIC, or SALIQUE LAW, *lex salica*, an antient and fundamental law of the kingdom of France, usually supposed to have been made by Pharamond, or at least by Clovis, in virtue whereof males are only to inherit. Du Haillan, after a critical examination, declares it to have been an expedient of Philip the long, in 1316, for the exclusion of the daughter of Lewis Hutin from inheriting the crown. Father Daniel, on the other hand, maintains that it is quoted by authors more antient than Philip the long, and that Clovis is the real author of it. This law has not any particular regard to the crown of France; it only imports, in general, that in salic land no part of the inheritance shall fall to any female, but the whole to the male sex. By salic lands, or inheritances, were antiently denoted, among us, all lands, by whatever tenure held, whether noble or base, from the succession where to women were excluded by the salic law; for they were by it admitted to inherit nothing but moveables and purchases wherever there were any males.

SALICORNIA, in botany, a genus of the monandria-monogynia class of plants, having no corolla: there is no pericar-

pium, but the calyx becomes more vtricose and contains a single seed.

A decoction of the leaves of this plant very opening, provokes urine and menses, accelerates the birth and secures, purges watry humours, when it is of service in a dropsey. Its ashes used in making soap and glass: and being infused in water, cure the itch and all cutaneous diseases, the part affected being washed therewith.

SALII, in roman antiquity, priests of Mars, whereof there were twelve, instituted by Numa, wearing painted particolour garments and high bonnets, with a steel cuirasse on the breast. They were called salii from *saltare*, to dance; because after assisting at sacrifices, they were dancing about the streets, with buckles in the left hand, and a rod in the right striking mutually on one another's buckles with their rods, and singing hymns in honour of the gods. In singing they had a peculiar antient song, called *Saliarum carmen*; and after the ceremony they were entertained with a feast. There were two companies or colleges of the salii; the antient one established by Numa, called *palatini*; the latter by Tullus Hostilius, called *collini* and *quirinales*. Sextus Pompeius makes mention of *saliarum virgines saliares*, hired on purpose, and joined with the salii, wearing a kind of military garb, with high round bonnets, like the salii.

SALINA, antiently Salamis, a port-town of the island of Cyprus, situated on the south side of the island, in east long. $34^{\circ} 30'$, and north lat. $34^{\circ} 30'$.

SALINE, a name given to a preparation of sea-salt, procured from the froth of the sea, hardened by the sun in hot countries. It is called by some authors *pilatro de Levante*, and is used in glass-making; and in the making the fine purple-colour from cochineal, by boiling it in a small quantity, with the bran and *soenugreek*, of which the magistery is made for that purpose.

SALINE is also the name given by authors to springs of salt-water, called by us salt-wells, salt-springs, and brine-pits.

SALINE principle, a term used by the chemical writers, to express a constituent part of several mixt bodies, on which their existence in that form depends; and which, though always existent in them, and always separable by art, is yet not perceivable in many of them in the complex.

SALINE

SALINE earths. The chemists under this, as a general head, reckon all those saline and earthy substances, which are calcined or burnt in the fire: as all the kinds of lime, pot-ashes, soot, and the like; these being so many mixtures of salt and earth; and all salts appearing to them, indeed, on a rigorous examination, to be only earths of different natures, which when reduced to a certain degree of subtilty or fineness of parts, so as permanently to dissolve in water, are then emphatically denominated salts.

SALINS, a city of France, in the province of Franche Comte, situated in east long. 5° 50', and north lat. 47°.

SALISBURY, the capital city of Wiltshire, situated eighty miles west of London, and thirty-five miles south-east of Bristol.

It sends two member to parliament.

SALIVA, **SPITTLE**, a thin pellucid humour, separated from the arterial blood, by the glands about the mouth and fauces, and conveyed, by proper salival ducts, into the mouth, for several uses.

It consists of a great deal of water or phlegm, and a volatile salt, and some add a sulphureous spirit; and is void both of taste and smell. Its uses are very great; it moistens the throat, preserves it from the injuries of the air, and facilitates speech. Being mixed with aliment, it renders swallowing easy, and assists digestion by its aqueous, saline, and oily parts. Some imagine it to do the office of a menstruum, by mixing the oily and aqueous parts of the food more intimately, dissolving the saline parts, and procuring a fermentation in the stomach: but Dr. Drake is of opinion, that were the saliva acrimonious enough for this purpose, it must greatly offend the stomach, especially considering the quantities of it that many swallow, even upon an empty stomach. In hungry persons, says Boerhaave, it is fluid, acrid, and copiously discharged; and in those who have fasted long, it is highly acrid, penetrating, and resolvent. In farinaceous and succulent vegetables, it not only produces a fermentation, but also augments one already begun. It is swallowed not only by brutes, but by human creatures, in a sound state, even when asleep. Too copious an evacuation of it, made voluntarily, produces loss of appetite, bad digestion, and an atrophy. By manducation therefore the saliva is expressed and accurately mixed with the attenuated food; which contributes, first, to the

assimilation of the aliments to the nature of the body to be nourished: secondly, to the due mixture of the oleous to the aqueous parts: thirdly, to the solution of the saline parts: fourthly, to fermentation: fifthly, to a change of the taste and smell of the aliments: sixthly, to an augmentation of the intestine motion: seventhly, to a momentaneous relief from hunger; and, eighthly, an application of the sapid parts, though insipid itself. See **CHYLIFICATION**, **DIGESTION**, &c.

SALIVAL, an epithet applied to the glands and ducts which supply and secrete the saliva. See the articles **GLAND**, **DUCT**, and the preceding article.

Anatomists commonly reckon three pair of salival glands, *viz.* two parotides, two maxillares, and two sublinguales. See the articles **PAROTIDES**, &c. These indeed are the largest, and furnish the greatest quantities of saliva; but there are a great number of other lesser glands of the same kind, which may be reckoned assistants, or substitutes to the former; all these may be determined salival glands, and they may be enumerated in the following manner: the parotid glands, the maxillary glands, the sublingual glands, the glandulæ molares, buccales, labiales, the linguales, the amygdalæ, the palatinæ, the uvulæ, the arytenoidæ, and the glandula thyroïdæa.

With regard to the salival ducts, the most noted of them is that of the parotides, produced by the union of a great number of small tubes, representing so many roots; it is called the ductus stenorius, or ductus superior; it runs obliquely forwards, on the outside of the masseter, and then perforates the buccinator from without inward, opposite the interstice between the second and third dentes molares, where the hole or orifice represents the spout of an ewer. The duct of the maxillary gland, called also the lower or inferior duct, and the ductus salivalis Whartoni, advances on the side of the musculus genioglossus along the inner part and superior edge of the glandula sublingualis to the frenum of tongue, where it terminates by a small orifice, in form of a papilla. The glandulæ sublinguales send out laterally several ducts, which open near the gums, by the same number of orifices, all ranked in the same line, but a small distance from the frenum, and a little more backward.

Extirpation of the SALIVAL glands, a method which Heister tells us he often has had recourse to, when these glands have been violently swelled and severely indurated, even approaching to a carcinomatous nature, after they had been treated by other physicians with corrosives, digestives and other medicines. In this operation the surgeon must open the skin above the tumour, with a longitudinal incision, and carefully separate the schirrhous glands from the contagious part with a knife, and at last from the arteries with which it is connected; then immediately, whilst the blood rushes out in great abundance, the operator must dip a ball of linen rags in a styptic liquor, and press it upon the larger wounded arteries; the remainder of the cavity of the wound must be filled with scraped lint and dry rags, and compressed with the finger, and then a larger piece of puff-ball, with three or four thick compresses must be applied, securing the whole with a proper bandage. After the third or fourth day, the bandage and compress may be removed, and so much of the puff-ball as is loose, leaving every thing that has a strong adhesion; then new compresses, dipped in warm spirit of wine, or digestive fomentations may be directly applied, and secured with the bandage, as before, but a little more relaxed: the second and third dressings must be performed every other day, and the rest must be renewed every day. In all the dressings it must be observed, that none of the compresses, puff-ball, or lint be removed, but what are quite loose: the wound may be cleansed by some digestive ointment, and incarnated by a vulnerary balsam. See the article WOUND.

SALIVATION, in medicine, a promoting of the flux of saliva, by means of medicines, mostly by mercury. The chief use of salivation is in diseases belonging to the glands, and the membrana adiposa, and principally in the cure of the venereal disease, though it is sometimes also used in epidemic diseases, cutaneous diseases, &c. whose crises tend that way. See the article POX, &c.

A salivation is excited, according to Boerhaave, 1. By washing the mouth with certain liquors. 2. By the slow and protracted mastication of some viscid matter, such as mastich, wax, and myrrh, especially if acrid substances are mixed with these, such as pellitory of Spain, pyrethrum, ginger, and pepper. 3. By

drawing into the mouth acrid and irritating vapours, such as those of tobacco, sage, rosemary, marjoram, thyme, a mother of thyme. 4. A salivation excellently excited by the action of such medicines as produce a gentle but long continued nausea, such as antimony neither entirely fixed nor totally emetic, taken with a small quantity of common vitriol. 5. By such substances as totally dissolve all the parts of the blood, convey it into lymph, and render it fit for a discharge by way of saliva; such as crude quick-silver, cinnabar, a solution of quick-silver in aqua fortis, white precipitate, red precipitate, turbith mineral, and sublimate mercury dissolved: the action of those medicines is promoted by warm fomentations applied to the head, neck, and face. An excessive salivation is lessened or stopped, 1. By a large and continual use of mild and tepid drinks, such as decoctions of mallows and liquorice in milk and water. 2. By allaying the impetus of the humours, by means of mild oleous, and anodyne emulsions, with proper addition of diacodium or opium. And, 3. By making a revulsion of the humours to other parts, especially to the stool. But great caution is necessary, lest the impetus of the moved matter, which in this case is always acrid, should rush to other parts, and produce a greater danger.

The regular, safest, and most commodious method of salivation is by mercurius dulcis six times sublimed, given inwardly, in the milder pox, &c. or by mercurial unction, when the disease is got into the bones. According to Turner, fifteen grains of mercurius dulcis may be given in a morning, and a like dose at night, with electuary of scordium. After three, four, or five days, with this management, the fauces are observed to inflame, the inside of the cheeks to tumify, the tongue to look white and foul, the gums to stand out, the breath to stink, and the whole inside of the mouth to appear shining and lie in furrows as if parboiled. The patient now refuses nourishment, while all parts of his chaps are to swell and sore that he cannot chew any solid food, but is forced to take liquids and the softer aliments. They are now frequently sick, and throw up a thin phlegm. The inside of the mouth thus beginning to be whealed, will soon be ulcerated, especially about the salival glands, which empty themselves thereinto. Now it may be proper

proper to desist a day or two, to observe the increase of the ulcers, what sloughs are like to be raised, and what their depth and dimensions are like to prove, from which a near conjecture may be made of the duration as well as quantity of the spitting now begun, and the consistence of the drilling lymphæ. The salivation thus begun, the patient is to be sometimes refreshed by a little mulled wine. Let his diet be small chicken-broth, water-gruel, and panada; his drink small sack-whey, or posset-drink, and a draught of good small beer, with a toast, between whiles; and in case of gripes or a looseness, the white decoction.

Thus, after some days respite, if the patient is hearty, his chaps but little swelled on the outside, and as little sore within, the ulcers not increasing, and the flux inconsiderable, you may give one scruple of mercurius dulcis in electuary of scordium at going to rest, repeating it two or three days following, as you find occasion; or you may vomit him with eight or ten grains of turpeth mineral, in conserve of roses: but if the salivation cannot be raised to any quantity, you must forbear, and purge it off, and give calomel once or twice a week, and purge it off the next day, or two days after. When the spitting goes well forward, it may be left to take its course, till it decline of itself, which, in proportion to the ulcers and thickness of the sloughs about the mouth, may happen at the end of twenty-one days, or a month from its first rising; that is, from the time of spitting a pint and a half a day, till it come to three pints or even five pints in twenty-four hours, then it gradually goes off again.

In the more stubborn and rebellious pox, &c. attended with grievous symptoms, such as rotten bones, &c. and the patient has been used to mercurials, or salivated before, then the cure must be attempted with salivation by unction. To this end mix an ounce of quicksilver with three ounces of axungia, of which an eighth part is to be used night and morning, letting the patient rub it with his own hands gently by the fire, beginning with his ancles, up to his shins and knees, all round his joints, and so to his thighs, which are presently after to be covered with yarn-stockings and flannel-drawers; then let him use the remainder of his eighth part about his elbows and shoulders, wiping his hands clean about the glands of his arm-pits, or those of his

groin: his body, during the unction, should be screened from the cold with a blanket hung behind him, and then be wrapped up in warm flannel, that is, a flannel-shirt, waistcoat, drawers, cap, and muffler. And the same is requisite in the former way, to defend the patient from the cold air. The weak need only to anoint once a day; but those that are strong, may take a fourth part of the ointment, and rub it in at once every night; after which let him get between flannel-sheets or blankets, disposing him to a gentle breathing sweat with a draught of warm posset, mace-ale, or if very feeble, with a cup of mulled wine. If, when the ointment is divided into four parts, after the third unction, the patient begins to complain of his chaps, you may stay a day or two before you proceed farther; the same when gripes or bloody stools approach. On the other hand, if an ounce or an ounce and an half of quicksilver will not do, give the turpeth, as before directed: and if the spitting declines too suddenly, give a scruple of calomel every day, for two or three times, as you see occasion. When the salivation is going off, the patient may be purged with two or three ounces of the common infusion of senna, and one ounce of the syrup of buckthorn.

For the several diseases that supervene a salivation, see each of them separately treated of, under their several heads.

To prevent the jaws from being locked up, it is necessary to use a bit of stick, covered with a soft rag, to be held between his backward teeth; and if there should happen an adhesion of the inside of the cheek to the gum, the same is to be carefully divided. If, during the salivation, a blood-vessel burst open, it is to be closed up with a little pellet, covered with powder of alum or vitriol, and dipped in the tinctura styptica: if it happens from the separation of sloughs from the sides of the cheeks, a little oxycrate held in the mouth will do the business. If the patient has been without a stool for some time, give him an emollient clyster of warm milk, sugar, and oil: and if the fauces should suddenly tumify, so as to endanger a suffocation, the most certain relief is to bring the humours downwards by sharp clysters and cathartics.

The patient should be prepared for a salivation by a lenitive purge or two; and if plethoric, he should bleed; likewise bathing

bathing in water warm, for some hot, lean, emaciated people, has been found of service. Women should be laid down just after their menstrual flux is over. Temperate weather is the most suitable.

SALIX, the **WILLOW**, in botany, a genus of the dioecia-diandria class of plants, having no flower-petals; the nectarium is a very small, cylindric, truncated, melliferous gland, in the center of the flower; the common amentum is oblong, and every where imbricated with oblong, plane, and patent squammæ, consisting of a single flower; the fruit is an ovato-subululated capsule, formed of two valves, and containing only one cell, in which there are several very small oval seeds, crowned with down.

The leaves of the willow are a very grateful food to cattle: a decoction of them is very good in a hæmoptoe; and a clyster is prepared of the same, for a dysentery. Externally they are of service in baths for the feet, in order to procure sleep, and cool the heat of fevers; the bark has the like virtues; and besides, the ashes thereof are reckoned effectual for extirpating warts and corns.

SALEE, a port-town of the empire of Morocco, in the kingdom of Fez, situated on the coast of the Atlantic ocean: west long. 7°, and north lat. 34°.

SALLET, or **SALLAD**, a dish of eatable herbs, ordinarily accompanying roast meat, composed chiefly of crude fresh herbage, seasoned with salt, oil, and vinegar: some add mustard, hard eggs, and sugar; others pepper; and others spices, with orange-peel, saffron, &c. The principal sallet-herbs, and those which ordinarily make the basis of our sallets, are lettuce, celeri, endive, cresses, raddish and rape; to which are sometimes added purslane, spinnach, sorrel, tarragon, burnet, corn-sallet, and chervil.

SALLY, in architecture, is what we more usually call projecture. See the article **PROJECTURE**.

SALLY, in the military art, the issuing out of the besieged, from their town or fort, and falling upon the besiegers in their works, in order to cut them off, nail their cannon, hinder the progress of their approaches, destroy their works, &c.

SALM, a town of Germany, in the dutchy of Lorrain, forty-five miles south-east of Nancy.

SALMO, **SALMON**, in ichthyology, a ge-

nus of the malacopterygious class of fishes, having large, sharp, and strong teeth in both jaws, and on the palate tongue, and fauces; the back-fin is placed nearer the head of the fish than the ventral ones; the body is, in most of the species, variegated with spots; and the branchiostegæ membrane contains ten, eleven, or twelve bones. The several species of this fish are the common salmon, the trout, the red charr, &c. See the article **TROUT**, &c.

The common salmon, or salmon, with the rostrum extending beyond the lower jaw, is an inhabitant both of the sea and rivers; the head is small in proportion to the body; the eyes are round, and their iris of a silvery colour, with a faint admixture of green; the pupil is black; the covering of the gills is of a silvery colour, and are composed of two, or rather of four bony laminae, and of twelve broad and somewhat crooked bones, connected by a membrane; there are some irregular black spots on them; the lateral line is very straight; the scales are moderately large, and placed in an imbricated manner; there is a single series of teeth in the upper and under jaw; there are two more teeth in the upper than the lower jaw; at the sides of the palate there are two series of teeth in longitudinal lines; the palate itself is entirely smooth, but deep in the fauces; the tongue is thick, and has on it a few sharp teeth; there are two fins on the back, the one having fifteen rays, and the other none at all.

SALON, or **SALOON**, in architecture, a very lofty spacious hall, vaulted at top, and sometimes comprehending two stories or ranges of windows. The salon is a grand room in the middle of a building, or at the head of a gallery, &c. Its faces or sides ought all to have a symmetry with each other; and as it usually takes up the height of two stories, its ceiling, as Daviler observes, should be with a moderate sweep. Salons are frequently built square, and sometimes octagonal.

SALON is also the name of a town of Provence, in France, twenty-four miles south-west of Marseilles.

SALONA, a port-town of Dalmatia, subject to Venice: east long. 18°, north lat. 43° 15'.

SALONICHI, a city and port-town of Macedon, in Turkey, antiently called Thessa-

Thessalonica, two hundred and sixty miles west of Constantinople: east long. 24° , north lat. 41° .

SALPA, in ichthyology, a species of the sparus, with eleven parallel longitudinal yellow lines on each side. See SPARUS.

SALSETTE, an island on the western coast of the hither India, separated from that of Bombay by a narrow channel: it belongs to the Portuguese, and is twenty miles long, and seventeen broad.

SALSES, a town of Roussillon, ten miles north of Perpignan, and subject to France.

SALSOLA, in botany, the name by which Linnaeus calls the kali of other botanists. See the article KALI.

SALSONNA, a town of Catalonia, in Spain, forty-six miles north-west of Barcelona.

SALT, *sal*, in natural history, the name of a series or subdivision of fossils, naturally and essentially simple, not inflammable, and soluble in water.

Dr. Shaw defines salt to be a substance that readily dissolves in water, tastes sharp or pungent upon the tongue, and has a great disposition to unite with earth, so as to appear in a solid form; as in common salt, alum, &c.

Salts then are fossile bodies, friable, pellucid, not inflammable, but fusible by fire, and congealing again in the cold; soluble in water, so as to disappear in it, naturally concreting into regularly figured crystals, and impressing a sensation of acrimony on the tongue. These are the characters and qualities common to all salts, and to no other bodies: and these they always manifest when pure and freed from heterogeneous substances; but in the state in which they are naturally found in the earth, though they have that in their taste alone which may sufficiently distinguish them, yet they do not exhibit all their genuine characters: some of them being found solid and pure, either within the earth or on its surface, but commonly without their proper form; others embodied in earths and stones, as the particles or metals in their ores; and others in a fluid state suspended in waters.

Of the fossils of this class, nature therefore affords us three distinct orders, and under those they are distinguishable into five genera. The salts of the first order are those found native and pure, either in the earth or without its surface, and exhibiting all other natural characters, though often without their proper form.

Of the second, are those found not native, but in form of ores, never pure, but distinguishable by their taste, and immersed in and blended with the constituent matter of earths and stones in extremely small particles. And of the third are those naturally found suspended in waters, and in a fluid form, but ready to assume their proper figures on the evaporation of a part of that water.

Of the first of these orders are the common alimentary salt or muria, and the natrum or nitre of the antients; of the second are alum and nitre; and of the third are borax and halcryptium, an alkaline salt hid in the chalybeate waters. See the articles NATRUM, ALUM, NITRE, BORAX, and HALCRYPTIUM.

Alimentary salt, or muria, is found under a great variety of forms in its different states; but is immediately distinguished by applying it to the tongue, and always assumes a cubic, pyramidal, or parallelopiped figure after solution, and a regular crystallization. It is sustained in vast quantities in a liquid form among sea-water, and that of salt springs; but is also found solid in the bowels of the earth in vast masses, which are either of a fine pellucid structure, and called sal-gem; or variously debased and striated, resembling the fibrose talcs, and is the sal ammoniac of the antients. See the article AMMONIAC.

But in which ever of these forms this salt is found, it affords the same crystals on evaporation: these, according to the degree of heat used in the evaporation, are either pyramidal, cubic, or parallelopiped. All these salts are soluble in water, but they require different quantities of it to dissolve them, and this makes one of their criterions. This salt requires thrice and one seventh part its own quantity of water, to make a perfect solution.

The sea-water, in different parts of the world, is very differently sated with it, some parts containing twice as much as others. But that of the salt springs is always much more salted with it, than the strongest of the sea-water: in some places it is found loaded with nearly as much as it could be made to contain, some springs yielding a brine that affords near a quarter of a pound of salt, from the pound weight of this liquor, and many of them being so strongly impregnated, that the workmen are obliged to let them down or lower them, by mixing

mixing them with a large quantity of sea or common water, before they are fit to be boiled for the salt: the common run of sea-water does not hold so much as one fourth part of this quantity, some not one eighth of it.

The salt produced from the sea-water of all the parts of the world, and from the brine of all the springs of the world, is absolutely the same; but differs in strength, and some other qualities, according to the operation by which it is made. In general, the quicker the liquor is evaporated, the weaker is the salt; the more time is employed in the process, the stronger. This is not wonderful, when we consider, that, over a gentle heat, water alone, or almost alone, evaporates from the liquor, but, over a more violent fire, a part of the strength or acid of the salt is raised with it.

It is upon this principle, and owing to this cause, that we find the salt of our salt springs, which is usually sold us under the name of basket-salt, the weakest of all. It is not that there is any difference in the waters from which these several kinds of salt are produced, that they appear to us in different degrees of strength, but that the people who work the brine-pits, make the salt with less expence of the workman's time; that the sea-salt is formed over somewhat slower fires, and that the bay-salt is made only by the sun's heat, where the process is very long, and the heat very moderate, and the salt is found strong in proportion. This is so indisputable a truth, that once every week, a very strong salt, little inferior to bay-salt in that quality, is made at the brine pit works, where the common run of the salt is the weakest in the world. The liquor is the same in this case, but the workmen who do not work on Sundays, leave a pan full to evaporate slowly over the fire, which they prepare on the Saturday night, and the moderate heat and length of time under which this weekly parcel of salt is made, render it very different from the common salt of the works, both in form and qualities: it is found to be made up of large and hard grains, instead of the small and soft ones of the common kind, and is vastly superior to it in strength.

This circumstance, overlooked by the workmen, and even by their masters too, for many years, gave the hint to Mr. Lowndes, and afterwards to the very ingenious Dr. Browning, author of an

excellent treatise on this subject, to propose to the government a new method of making a strong salt fit for all the purposes for which they buy it of our neighbours, only by a new, that is, a slower way of working our own brines. The latter of these gentlemen has proved, incontestably, that we may, if we will encourage proper manufactures, have common salt of every kind made at home equal in strength, and equally fit for all purposes, with the salt of any part of the world.

After these accounts of the muria or common salt under its different forms, and as expressed by different names, it remains to treat of its qualities and virtues in general.

It resolves spontaneously in the air, but this in different times, according to the dampness or driness of that element, and according to its own laxer or firmer structure. The coarser salts dissolve sooner than the finer, and there are even some pieces of sal gemmæ so firm, that they are scarce to be at all affected, even on their surface, by the moistest common air.

Common salt, added to aqua fortis, enables it to dissolve gold, making it into what is called aqua regia; by distillation it yields a strong and acid spirit; it is the most, of all substances, endued with keeping animal bodies from putrefaction, and it also preserves vegetables in the same manner in long digestions. In medicine, it is a common ingredient in clysters, and serves to soften and bring away indurated fæces. Suppositories are also made of a mixture of it with honey, and are put up the fundament, to promote a tendency to desuctions. Aloes and colocynth are sometimes added on these occasions, when there is required more power in the medicine. In apoplectic cases, it is generally an ingredient among the stimulating things administered in clysters; only it is necessary to have this caution, that if there appear reason to suspect an inflammation of the intestines, or but a tendency to it, every thing of this kind is to be avoided.

Common salt that has not been exposed to the fire, makes no change in the colour of syrup of violets; it does not make any effervescence with oil of tartar, nor does it make lime-water turbid, but added to spirit of sal armoniac, it manifests some signs of a latent acidity, by rendering it cloudy: on the contrary, also, it mani-

fests

sests something of an alkaline nature, by rendering a solution of mercury whitish; and it raises an effervescence with oil of vitriol, attended with heat.

On solution in water, common salt manifests also two very different principles after evaporation. When reduced to a proper consistence, that is, when the quantity of water is not more than as three to one to that of the salt, a part of it concretes into grains of salt of the ordinary kind; but there remains yet in the liquor, after all that can be separated this way has been procured, a strong taste of a saline nature: the salt that gives it this, will never be brought to crystallize, but must be separated by evaporating all the liquor away; it is then found to be of an alkaline nature, assuming no regular form in its crystals, and easily imbibing the humidity of the air, and running into a liquor with it.

The basis of sea-salt, therefore, is a mineral alkali, which is so intimately blended with its peculiar acid, that the latter has scarce any power of exerting itself. The acid, drawn by distillation from sea-salt, turns the syrup of violets red, and ferments vehemently, though without heat, with oil of tartar, but it does not heat on being poured into lime-water. This spirit is the only one that can be properly called a solvent for gold and for tin, but silver and lead resist it. The acids of nitre and vitriol, also, obtain the same qualities on being mixed with it, and become aquæ regales. If this acid be perfectly saturated with salt of tartar, crystals of the form and qualities of those of common salt may be obtained from the mixture; these crystals are called regenerated sea-salt, and serve to prove what we observed above, that an alkali is the basis of sea-salt, and that more alkalies than one may serve to that purpose with the peculiar acid, which is the essential part of this salt.

Physicians are of opinion, that sea-salt has the same effects in the human body that it has out of it, in checking fermentation, and preventing putrefaction; they therefore esteem it of good use mixed with the generality of our foods in the stomach: they are of opinion also, that it carries its effect into the blood, and has the qualities of a moderate drier, detergent and attenuant, added to those of a stimulant, which common reason declares it to be. Hence may be deduced all the virtues attributed to salt, as an

aperient, stomachic, or warming medicine, and a provocative to venery; but in what degree it possesses all these qualities, we are, by its universal use in foods, prevented from being able to determine. Van Helmont recommends it as a good preservative against the stone and gravel: he has been severely censured for this by others, who are of opinion, that all salted foods, such as salt beef, and the like, are very bad in those cases: but both parties may be in the right; for there is a great deal of difference between common salt eaten with the fresh juices of our food, and the brine and pickle into which it runs in the time of its being left upon the meat preserved by it. Salt is very properly put into the mouths of people in apoplectic fits, as it not only irritates but attenuates the juices there, and promotes a discharge of them; and in a palsy which affects the tongue, a sage-leaf, bruised and covered with salt, has been a famous remedy among the good women, and not without reason.

Mixed with bran, and heated in a canvas bag, it is recommended to be applied externally to the head in head-achs, arising from a moist cause, and in defluxions; and we find the old physicians very strenuously recommending a cataplasm made of the same ingredients for pains.

Methods of making alimentary SALT are these. 1. By the evaporation of the sun's rays: this is the most easy and simple method of all, when the waters of ponds and lakes, whether natural or artificial, impregnated with salt, being wholly exhaled by the force of the sun and air, the salt is left concentered into a hard crust at the bottom of the lake, and is what commonly goes by the name of bay-salt; the crystals of which differ in size, according to the different degrees of heat, and the time it lies in the pits. All bay-salt has some mud, slime, or the like, in the making, and some kinds are mixed with the bittern-salt, or what is called Epfom salt; they are all more white while dry, and more pellucid when moist, and they differ in colour, according to the earth which makes the bottoms of the pits. Thus some of the french bay-salt is grey, some reddish, and some white, according as a blue clay has lined the pits, or a red or white one. Some kinds have an agreeable smell in large heaps; such are the Portuguese, and the Hampshire bay-salts; and this

this seems owing to the sea-water they were made from, having a bituminous matter in it. It differs also greatly in taste, according to the various foreign mixtures it contains; and it will often alter in taste, and other qualities, by long keeping: for, in general, it is much fitter for use, after it has been kept some time in a dry place, than when it is first made.

2. By boiling or coction; the most convenient works for which process are constructed in the following manner: the saltern or boiling house, is erected near the sea-shore, and is furnished with a furnace, and one or two large pans, which are commonly made of iron-plates, joined together with nails, and the joints filled with a strong cement; and the bottoms of the pans are prevented from bending down, by being supported by strong iron-bars.

The salt-pan being filled with sea-water, a strong fire of pit-coal is lighted in the furnace, and then, for a pan which contains about fourteen hundred gallons, the salt-boiler takes the whites of three eggs, and incorporates them all with two or three gallons of sea-water, which he pours into the salt-pan, while the water contained therein is only lukewarm, and mixes this with the rest by stirring it about with a rake. In many places they use, instead of eggs, the blood of sheep or oxen to clarify the sea-water; and in Scotland they do not give themselves the trouble to clarify it at all. As the water heats, there arises a black frothy scum upon it, which is to be taken off with wooden skimmers. After this the water appears perfectly clear, and by boiling it briskly about four hours, a pan loaded in the common way, that is about fifteen inches deep, will begin to form crystals upon its surface. The pan is then filled up a second time with fresh sea-water; and about the time when it is half filled, the scratch-pans are taken out and emptied of a white powder, seeming a kind of calcarious earth, which separates itself from the sea-water, during its boiling, before the salt begins to shoot. When these have been emptied, they are again put into their places, where they are afterwards filled again. This powder being violently agitated by the boiling liquor, does not subside till it comes to the corners of the pan, where the motion of the mass is smaller, and it there

falls into these pans placed on purpose to receive it.

The second filling of the pan is boiled down after clarifying in the same manner as the first, and so a third and fourth; but in the evaporation of the fourth, when the crystals begin to form themselves, they slacken the fire, and only keep the liquor simmering. In the heat they keep it all the while that the salt is granulating, which is nine or ten hours. The granules or crystals all fall to the bottom of the pan; and when the water is almost all evaporated, and the salt lies nearly dry at the bottom, the rake it all together into a long heap on one side of the pan, where it lies a while to drain from the brine, and then is put into barrows and carried to the storehouse, and delivered into the custody of his majesty's officers. In this manner the whole process is usually performed in twenty-four hours, the salt being commonly drawn out every morning. This is the method in most of our salt-works; but in some they fill the pan seven times before they boil up the salt, and so take it out but once in two days, or five times in a fortnight. In the common way of four boilings, a pan of the usual size, containing one thousand three hundred gallons, they draw from fifteen to twenty bushels of salt every day, each bushel weighing fifty-six pounds.

When the salt is carried into the storehouse, it is put into drabs, which are partitions, like stalls for horses, lined on three sides, and the bottom with boards, and having a sliding board on the forehead to draw up on occasion. The bottoms are made shelving, being highest at the back, and gradually inclining forward; by this means the brine remaining among the salt, easily separates and runs from it, and the salt in three or four days becomes sufficiently dry; in some places they use cribs and barrows, which are long and conic wicker-baskets, for this purpose; and in some places wooden troughs with holes in the bottom. The saline liquor which remains from the making of salt, is what is called bittern. See the article BITTERN.

Much in the same manner is the salt obtained from the brine of salt springs, pits, &c. White salt is prepared from sea water, or any other kind of salt-water, first heightened into a strong brine by the heat of the sun, and the operation

of the air. It may also be prepared from a strong brine, or lixivium, drawn from earths, stones, or sands, strongly impregnated with common salt. Refined rock-salt is that obtained by dissolving fossil or rock-salt in salt of fresh water, and afterwards boiling the solution. And, lastly, salt upon salt is made from bay-salt dissolved in sea-water, or other water, and boiled to a white salt.

Preparations of common SALT, in use in the shops, are, 1. Decrepitated salt, thus made: put a quantity of salt in an earthen vessel capable of bearing the action of the fire, cover it with a lid, and set it on a moderately strong charcoal fire, heaping up the coals about it as high as the salt reaches within; let the lid be taken off at times, and the matter stirred well about with an iron-spatula. It will make a violent crackling for a long time, but at length the noise will cease, and the salt be reduced to a dry powder; this is decrepitated salt. It is used in the cementation of metals, in many other chemical and metallurgical operations, and in distilling the acid spirit from the salt, much trouble and time being saved by this previous calcination, though none of the spirit will be dissipated by it. 2. The acid spirit of sea-salt, which may be distilled by the retort, by mixing two parts of pipe-clay, or the like earth, with one part of decrepitated salt; forming the whole into balls with water, and distilling these after they are dried, in a reverberatory furnace, with a coated retort and a large receiver. Another method of obtaining this spirit is this: take sea-salt and oil of vitriol, of each an equal quantity; of common water, a fourth part of the weight of the whole: mix the water and the oil of vitriol together, in an earthen vessel; then pour them into a retort, and add to them the salt by small quantities at a time: fit on a receiver, and distil the spirit by a fire, gentle at first, but afterwards raised to a considerable strength. The mixture of these ingredients should be made under a chimney, and the vapours carefully avoided, as being of the most fatal suffocating kind. This spirit is used in many metallurgic operations. 3. The sweet spirit of salt, made thus: mix together three parts of rectified spirit of wine, and one part of spirit of salt; let them stand in digestion three weeks or a month, in a tall matras. The mixture will in this time acquire a very fragrant

smell, and is to be preserved for use. It is given in the same cases with the sweet spirit of nitre, and promotes the discharges by urine, and therefore is good in the gravel and dropsies: it is also recommended in malignant fevers and hernias; its dose being from five to fifteen drops, in any convenient vehicle. 5. Glauber's salt, a very cheap cathartic or purging salt. See GLAUBER'S SALT.

SALT, in chemistry, makes one of the leading and most active principles, or elements, procurable from mixt bodies. See PRINCIPLE and ELEMENT.

There are three kinds thus obtained, two whereof are volatile, and the third fixed. The volatile, are acrid and urinous salts; the fixed, lixivious, or those drawn from ashes: the urinous and lixivious salts are also called alkalies, or alkalious salts; the former being volatile, and the latter fixed. We do not know the precise figure of each of these salts; but to judge of them by their effects, acid salts should seem to be pointed, and those points tipped with sulphureous matter: whereas the urinous and lixivious salts seem to be like a sponge, containing a part of the acid, and a little fetid oil. See ACID, ALKALI, and LIXIVIOUS.

Acid salts are ranged, by Homberg, under three classes, *viz.* such as contain an animal or vegetable sulphur; as all the acids distilled from plants, fruits, woods, &c. and spirit of nitre: such as contain a bituminous sulphur, to which belong the acids of vitriol, common sulphur, and alum: and such as contain a more fixed mineral sulphur; as the acids drawn from the sea-salt, and sal gem. Those of the first class act more swiftly than those of the others, and those of the second are the least nimble. Acid salts, joined with lixivious ones, compose mixed or intermediate salts: thus, spirit of nitre, with salt of tartar, produce a true salt-petre; spirit of salt, with salt of tartar, produce true common salt; and spirit of vitriol, with salt of tartar, produce true vitriol; which are all mixed or intermediate salts, *i. e.* partly fixed and partly volatile, the ingredients still retaining their original natures. Acids, joined with urinous salts, compose another salt called ammoniac salts, which are always volatile.

In all native salts, both fossil, vegetable, and animal, after the violence of the fire has separated all the volatile parts, there still remains a fixed salt, to be

drawn from the *feces* by lotion, or lixiviation; hence called a lixivious salt, which is no other but the relics of the acid salts, that the fire was not able to separate from the earth of the mixed body, but may be separated by dissolving them in common water. The taste of these lixivious salts is very different, according to the quantity of the acids still remaining after calcination; part of which is still capable of being volatilized by a more intense heat, or by dissolution, digestion, filtration, and evaporation frequently repeated; or, by adding some urinous salt, to absorb the same.

We have three sorts of urinous salts, *viz.* that of plants or animals, which is the same; the second is fossil; and the third of an intermediate kind, partaking both of the fossil and vegetable nature; the first is volatile, and the two latter fixed. By urinous salts, we mean all such as partake of the taste or smell of urine; their effect in volatilizing fixed salts is well known; for being added to common salt, there arises, by fire, a volatile salt, called *sal ammoniac*. However, for volatilizing the fixed salts of plants, the urinous salts of plants are not so proper as the urinous salts of the intermediate class, such as alum; and for the fixed salts of fossils, the urinous salt is fittest, *viz.* borax.

All the sorts of salts, then, appear evidently compound and unelementary; and that they are producible *de novo*, and convertible into one another is strenuously argued by Mr. Boyle. The two chief qualities wherein they all agree, he observes, are to be easily dissoluble in water, and to affect the palate, so as to cause a sense of taste. Now that a disposition to be dissoluble in a liquor, may be acquired by mixture, and a new texture of parts, appears from many instances; and as for the taste, it is some question, how far the necessity thereof may consist with another principle; for the purest oils are sapid, yet will not dissolve in water; so that there does not appear any strict connection between being sapid and soluble in that fluid.

For acid salts, we may instance in nitre; which, though it have no acid taste, may be made to afford by distillation, above three quarters of its weight, of a highly acid liquor: yet it does not appear, that such a great proportion of acid particles, or possibly any proportion at all, is em-

ployed by nature in the composition of nitre.

For urinous salts, we have an instance of their production, in the salt obtained by distillation from *soot*: for though the wood, we burn in our chimneys, seems to have nothing of the taste or smell of urine, nor have the dissolutions of the saline parts of such wood been observed to have any affinity, in taste or odour, thereto; yet when wood is burnt in the fire, and the *soot* afforded by it distilled, we get a white volatile urinous salt, like what is obtained from blood, urine, or the like.

For lixivious, or the fixed salts of calcined bodies, the chemists themselves are not entirely agreed; for however the prevailing opinion may be, that those fixed alkalies pre-exist in mixed bodies, Helmont very ingeniously proposes another origin, and holds them, as to their alkaline form, productions of the fire, by whose violent action a part of the salt, which in the concrete is all naturally volatile, laying hold of some parts of the sulphur of the same body, both become melted together, and thus fixed into an alkali.

It would, no doubt, contribute greatly to the improvement of chemistry, and natural philosophy, to form a table of the time and quantity wherein all the known salts are dissoluble in water. Epsum-salt presently dissolves in about an equal quantity of water; common salt dissolves in about four times; nitre, in about five or six times; and salt of tartar, in about twice its own quantity of water; but cream of tartar requires twenty times its own quantity of boiling water, to dissolve it. Such a table, regularly formed, might ease the trouble of refining salts; by shewing, at once, how much water each salt requires to dissolve it, for clarification, or crystallization. It would likewise supply us with a ready and commodious way of separating any mixture of salts, by shewing which would shoot out of the mixture first upon crystallization: for the rule is, that the salt which requires the largest proportion of water to dissolve it, will shoot the first; and thus it is, that nitre is totally separated from common salt, in the ordinary process for refining it. The same table might also direct us to a ready method of separating two salts, without waiting for crystallization: thus

suppose

suppose tartar of vitriol were mixed with epſom-falt, if water be poured upon the mixture, it will preſently drink in the epſom-falt, leaving the tartar of vitriol untouched; and the ſame is to be underſtood of other mixtures of ſalts.

If, ſays Dr. Shaw, the physical reaſon be demanded, why one ſalt more readily diſſolves in water than another, we recommend it to farther examination, whether all ſorts do not diſſolve in water with greater or leſs facility, and in greater or leſs proportion, according as they contain more or leſs of a groſs, unctuous ſubſtance, unfuitable to the nature or fineneſs and lubricity of parts required in water. The comparing epſom-falt, ſalt of tartar, common ſalt, &c. with nitre, alum, crude tartar, &c. he thinks will make this more than a conjecture. Hence, in order to leſſen the trouble and expence of procuring the volatile ſalt of animal ſubjects, they ſhould be firſt purged of their oil and unctuous parts, by boiling in water; after which, they will afford volatile ſalts and ſpirits, as pure, or purer, than thoſe obtained from unboiled hartſhorn.

The ſame gentleman obſerves farther, that the unrectified volatile ſalts of vegetable and animal ſubſtances, are true ſales volatiles oleoſi; and according to the difference of the oil wherein they abound, they are properly diſtinguiſhed into ſalt of hartſhorn, of ox-bone, of human blood, of ſilk, &c. But that when theſe oils are totally ſeparated from them, they become one and the ſame undiſtinguiſhable volatile ſalt; for that it is the admixture of oil that gives the colour to volatile ſalts, they being permanently white when the oil is ſeparated. Theſe volatile ſalts are obtainable from all kinds of land-animale, the amphibious and ſubterraneous tribe, birds, fiſhes, and reptiles; alſo from alkaline vegetables without putrefaction, and from other vegetables after putrefaction; from ſoot, horns, hoofs, and all reſuſe of animal and vegetable matters, as urine, the blood of ſlaughter-houſes, &c. and this as pure and perfect as from hartſhorn; whence volatile alkalies, and ſal ammoniac, might be afforded very cheap.

The volatile animal, and fixed vegetable ſalts, differ chiefly with regard to their volatility, and fixedneſs, and the effects thereon depending; but agree in other reſpects: thus they both make an efferveſcence, and turn neutral, when

ſaturated with acids; they are both corroſive, hot, and fiery, &c.

SALT WATER, or SEA WATER: See the article SEA.

SALT, or SAULT, in the manege, the ſame with leap. See LEAP.

SALTASH, a borough of Cornwall, which ſends two members to parliament, and is ſituated 20 miles ſouth of Launceſton.

SALTIER, in heraldry, an ordinary in form of a St. Andrew's croſs; which may be ſaid to be compoſed of a bend dexter and ſiniſter, croſſing each other in the center of the eſcutcheon. See plate CCXXXVI. fig. 3.

SALT-PETRE, the ſame with nitre. See the article NITRE.

SALTSBURG, the capital of an arch-biſhopric of the ſame name, in Bavaria, ſituated on the river Saltza, ſeventy miles eaſt of Munich: eaſt long. 13°, north lat. 47° 45'.

SALVADORA, in botany, a genus of the tetrandria-monogynia claſs of plants, the calyx of which is a ſingle leaved perianthium, cut into four revolute ſegments; there is no corolla, the fruit is a globular berry, containing only one cell; the ſeed is ſingle and ſpherical.

SALVAGE MONEY, a reward allowed by the civil and ſtatute law, for the ſaving of ſhips or goods from the danger of the ſea, pirates, or enemies.

Where any ſhip is in danger of being ſtranded, or driven on ſhore, juſtices of the peace are to command the conſtables to aſſemble as many perſons as are neceſſary to preſerve it; and on its being preſerved by their means, the perſons aſſiſting therein ſhall in thirty days after be paid a reaſonable reward for the ſalvage, otherwiſe the ſhip or goods ſhall remain in the cuſtody of the officers of the cuſtoms, as a ſecurity for the ſame.

SALVATELLA, in anatomy, a branch of the axillary vein, which runs over the back of the hand towards the little finger.

SALVATERRA, a town of Spain, in the province of Eſtreſmadura: weſt long. 7° 5', north lat. 38° 30'.

SALVATIERRA, a town of Spain, in the province of Galicia, fifty miles ſouth of Compoſtella.

SALVE REGINA, among the romanists, a latin prayer addreſſed to the Virgin Mary, and ſung after complines; alſo at the execution of criminals.

SALVER, a plate, commonly of ſilver, and ſupported with a foot; uſed to ſet glaſſes

glasses on, to serve wine and other liquors.

SALVIA, *sage*, in botany, &c. See **SAGE**.

SALUTATION, the act of saluting, greeting, or paying respect and reverence to any one.

There is a great variety in the forms of salutation. The orientals salute by uncovering their feet, laying their hands on their breasts, &c. In England, we salute by uncovering the head, bending the body, &c. The pope makes no reverence to any mortal, except the emperor, to whom he stoops a very little, when he permits him to kiss his lips. A prince, or person of extraordinary quality, is saluted at his entering a garri-son by the firing of the cannon round the place. In the field, when a regiment is to be reviewed by a king, or his general, the drums beat, as he approaches, and the officers salute him one after another, as he passes by, stepping back with the right foot and hand, bowing their half pikes to the ground, and then recovering them gently, bringing up the foot and hand, and planting them; which done, they pull off their hats without bowing. The ensigns salute all together, bringing down their colours near the ground directly before them at one motion, and having taken them up again, gently lift their hats.

At sea, they salute by a discharge of cannon, which is greater or less, according to the degree of respect they would shew; and here ships always salute with an odd number of guns, and galleys with an even one. To salute with muskets is to fire one, two, or three volleys; which is a method of salutation that sometimes precedes that of cannon, and is chiefly used on occasion of feasts. After the cannon, they also sometimes salute or hail with the voice, by a joint shout of all the ship's company, repeated three times; which salutation also occasionally obtains where they carry no guns, or do not care to discharge any. Saluting with the flag is performed two ways, either by holding it close to the staff so as it cannot flutter, or by striking it so as it cannot be seen at all, which is the most respectful. Saluting with the sails is performed by hovering the top-sails half-way of the masts. Only those vessels that carry no guns salute with the sails.

SALUZZO, a city of Italy, the capital of a marquisate of the same name in

Piedmont, seventeen miles south of Turin.

SALZ, **SULZ**, **SALTZ**, or **SULTZ**, a sort of brine or pickle made of salt dissolved by the coldness or moisture of a cellar.

SAMARCAND, a city of Usbec Tartary formerly its capital: east long 66°, north lat. 40°.

SAMARIA, an ancient city of Palestine in Asiatic Turkey, forty five miles north of Jerusalem.

SAMARITANS, an ancient sect among the Jews, still subsisting in some parts of the Levant, under the same name.

Its origin was in the time of Rehoboam under whose reign the people of Israel were divided into two distinct kingdoms, that of Judah and that of Israel; where the capital of the latter being Samaria the Israelites obtained the name of Samaritans.

They were antiently guilty of idolatry and the rabbins pretend, that they worshipped the figure of a dove on mount Gerizim; but the present Samaritans who are but few in number, are far from being idolaters. They celebrate the passover every year, on the fourteenth day of the first month, on mount Gerizim and begin that feast with the sacrifice appointed for that purpose in Exodus; they keep the sabbath with all the rigour with which it is enjoined in the book of Exodus, none among them stirring up of doors but to the synagogue: they sacrifice no where but on mount Gerizim; they observe the feasts of expiation, tabernacles, harvest, &c. and never defer circumcision beyond the eighth day; they never marry their nieces as the Jews do; have but one wife; and in fine, do nothing but what is commanded in the law.

SAMARITAN MEDALS, some antient medals in the cabinets of our antiquaries the inscriptions and legends of which are in hebrew; but the character differs from the hebrew of our bibles, which is the square hebrew, or chaldee; from this character, and not from their being struck by the Samaritans, they are denominated Samaritan.

Of these there are four kinds: the first bear expressly the name of Simon, and the subject for which they were struck, viz. the deliverance of Jerusalem. The second have not the name of Simon, but only the deliverance of Sion or Jerusalem. The third have neither Simon nor the deliverance of Sion; but only the

the epochas, first year, second year, &c. The fourth class have neither any inscriptions, nor any thing whence we may judge of the time when they were struck. The three first were certainly struck by the Jews, after their return from the babylonish captivity, and in the time of Simon Maccabeus, after Jerusalem had been freed from the yoke of the greeks; but though they were struck after the captivity, the learned jesuit Souciet observes, that their character shews itself to be that of the antient hebrew, the use of which was lost by the people during their sojourning in Babylon and Chaldæa; but was again restored after their return, on the same footing as before.

AMBALLAS, or **SAMBLAS ISLANDS**, several islands situated in the american ocean, near the coast of Darien, none of which are inhabited: east long. 81° north lat. 10°.

AMBRE, a river of the Netherlands, which rises in the confines of Picardy, and falls into the Maese at Namur.

AMBUCUS, the **ELDER**, in botany, a genus of the pentandria-trigynia class of plants, the flower of which consists of a single rotated semiquinquefid petal; its fruit is a roundish unilocular berry, containing three seeds, convex on one side, and angulated on the other.

The inner green bark of this shrub is gently cathartic: an infusion of it in wine, or its expressed juice, in the dose of half an ounce, or an ounce, is said to purge moderately; and in small doses, to prove an efficacious deobstruent, capable of promoting all the fluid secretions. The young buds, or rudiments of the leaves, are strongly purgative, but are reckoned unsafe. The expressed juice, inspissated to the consistence of a rob, proves an useful aperient medicine, which is good in obstructions of the viscera, and promotes the natural evacuations.

AMBUCUS, is also an antient musical instrument of the wind-kind, resembling a flute; probably thus called, because made of elder.

AMIAN EARTH, in the materia medica, the name of two species of marle used in medicine, viz. 1. The white kind, called by the antients, collyrium samium; being astringent, and therefore good in diarrhæas, dysenteries, and hæmorrhages; they also used it externally in inflammations of all kinds. 2. The brownish-white kind, called after samius, by Di-

oscorides: this also stands recommended as an astringent. See **MARLE**.

SAMOGITIA, a maritime province of Poland, bounded by Courland on the north, and by the Baltic on the west.

SAMOIDA, the most northerly province of Russia in Europe, situated on the frozen ocean, and the river Oby.

SAMOLUS, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of a single petal, the tube is very short, only the length of the cup, and patalous; the limb is plane and divided into five segments, and there are placed five connivent squamulæ at the base of the sinus of the limb; the fruit is an oval capsule surrounded by the cup, and containing only one cell; the seeds are numerous oval and small.

SAMOS, a fertile island of the Archipelago, thirty miles south of Smyrna: east long. 27° 30', north lat. 37° 30'.

SAMOSATENIANS, in church-history, the same with paulionists. See the article **PAULIONISTS**.

SAMOTHRACIA, a small island in the Egean sea, near the coast of Thrace.

SAMPSEANS, in church-history, an antient sect, who were properly neither jews, christians, nor gentiles, though they took their name from the hebrew word *semes*, sun; as though they worshipped that planet.

They acknowledged only one God; washed themselves often; and in almost every thing attached themselves to the religion of the Jews. Many among them abstained wholly from eating of flesh. Scaliger will have the sampseans to be the same with the esseni; and indeed the sampseans, esseni, elcesaites, and massaliens, appear to be no more than so many different names for the same sect.

Books of **SAMUEL**, two canonical books of the Old Testament, so called, as being usually ascribed to the prophet Samuel.

The books of Samuel, and the books of Kings are a continued history of the reigns of the Kings of Israel and Judah; for which reason the books of Samuel are likewise styled the first and second books of Kings. Since the first twenty-four chapters contain all that relates to the history of Samuel, and that the latter part of the first book, and all the second, include the relation of events that happened after the death of that prophet, it has been supposed that Samuel was author only of the first twenty-four chapters, and

and that the prophets Gad and Nathan finished the work. The first book of Samuel comprehends the transactions under the government of Eli, and Samuel; and under Saul, the first king; and also the acts of David, whilst he lived under Saul; and is supposed to include the space of an hundred and one years. The second book contains the history of about forty years, and is wholly spent in relating the transactions of king David's reign.

SAMYDA, in botany, a genus of the icosandria-monogynia class of plants, the calyx of which is situated under the germen, and it has no corolla or flower petals.

SANBENEDITO, a town of Italy, in the dutchy of Mantua, nine miles south of the city of Mantua.

SAN BENITO, or **SACO BENITO**, a kind of linen-garment worn by persons condemned by the inquisition. See the articles **INQUISITION** and **ACT of FAITH**.

SANCTIFICATION, the act of sanctifying, or rendering a thing holy.

The reformed divines define sanctification to be an act of God's grace, by which a person's desires and affections are alienated from the world, and by which he is made to die to sin, and to live to righteousness; or, in other words, to feel an abhorrence of all vice, and a love of virtue and religion.

SANCTION, the authority given to a judicial act, by which it becomes legal and authentic.

Thus the royal assent gives a sanction to all bills that have passed both houses of parliament.

Pragmatic SANCTION. See the article **PRAGMATIC SANCTION**.

SANCTI VITI CHOREA. See the article **VITUS'S DANCE**.

SANCTUARY, among the Jews, also called *sanctum sanctorum*, or holy of holies, was the holiest and most retired part of the temple of Jerusalem, in which the ark of the covenant was preserved, and into which none but the high priest was allowed to enter, and that only once a year, to intercede for the people. Some distinguish the sanctuary from the *sanctum sanctorum*, and maintain that the whole temple was called the sanctuary.

To try and examine any thing by the weight of the sanctuary, is to examine it by a just and equal scale: because, among the Jews, it was the custom of

the priests to keep stone weights, to serve as standards for regulating all weight, though these were not at all different from the royal, or profane weight. Sanctuary, in the romish church, is a place used for that part of the church in which the altar is placed, encompassed with rail or balustrade.

SANCTUARY, in our antient customs, the same with asylum. See **ASYLUM**.

SAND, *arena*, in natural history, a genus of fossils, the characters of which are, that they are found in minute concretions; forming together a kind of powder, the genuine particles of which are all of a tendency to one determinate shape, and appear regular, though more or less compleat concretions; not to be dissolved or disunited by water, or forced into a coherent mass by means of fire, but retaining their figure in it; transparent, vitrifiable by extreme heat, and indissoluble in, nor effervescing with, acids. Sands are subject to be variously blended both with homogeneous and heterogeneous substances, as that of talcs, &c. and hence as well as from their various colour are subdivided into, 1. White sand, whether pure or mixed with other arenaceous or heterogeneous particles; of all which there are several species, differing no less in the fineness of their particles, than in the different degrees of colour, from a bright and shining white to a brownish, yellowish, greenish, &c. white. 2. The red and reddish sand, both pure and impure. 3. The yellow sands, whether pure or mixed, are also very numerous. 4. The brown sand, distinguished in the same manner. 5. The black sands, whereof there are only two species, *viz.* a fine shining greyish black sand, and another of a fine shining reddish-black colour. 6. The green kind, of which there is only one known species, *viz.* a coarse variegated dusky green sand, common in Virginia. Sand is of great use in the glass-manufacture; the white writing sand being employed for making of the white glass, and a coarse greenish-looking sand for the green glass.

In agriculture, it seems to be the office of sands to make unctuous earths fertile and fit to support vegetables, &c. For earth alone, we find, is liable to coalesce and gather into a hard coherent mass, as appears in clay; and being thus embodied, and as it were glued together is no way disposed to nourish vegetables.

But

But if such earth be mixed with sand, its pores are thereby kept open, and the earth itself loose, so as thus to give room for the juices to ascend, and for plants to be nourished thereby. A vegetable planted only in sand, or in a fat glebe, or in earth, receives little growth or increase; but a mixture of both renders the mass fertile. In effect, earth is in some measure made organical by means of sand; pores and spaces, something analogous to vessels, being thereby maintained, by which the juices may be conveyed, prepared, digested, circulated, and at length discharged.

Common sand is a very good addition, by way of manure, to all sorts of clay-lands; it warms them, and makes them more open and loose. The best sand for the farmer's use is that which is washed by rains from roads or hills, or that which is taken from the beds of rivers; the common sand that is dug in pits never answers nearly so well. However, if mixed with dung, it is much better than laid on alone: and a very fine manure is made by covering the bottom of sheep-folds with several loads of sand every week, which are to be taken away, and laid on cold stiff lands, impregnated as they are with the dung and the urine of the sheep.

Beside clay-land there is another sort of ground very improveable by sand; this is that sort of black boggy land on which bushes and sedge grow naturally, and which they cut into turf, in some places. Six hundred load of sand being laid upon an acre of this land, according to the Cheshire-measure, which is near double the statute-acre, meliorate it so much, that without plowing, it will yield good crops of oats or tares, though before it would have produced scarce any thing. If this crop is taken off, the land be well dunged, and laid down for grass, it will yield a large crop of sweet hay.

Once sanding this land will improve it for a vast number of years, and it will yield two crops of hay in the year, if there be weather to make it in. Some land in Cheshire has been, by this means, rendered of twelve times its former value to the owner. The bogs of Ireland, when drained, have been rendered very fruitful land, by mixing sand in this manner among the earth, of which they consist. Add to this, that in all these boggy lands, the turning them, or firing their own turf upon them, is also a

great advantage. The common peat, or turf-ashes, mixed with the sand for these purposes, add greatly to its virtue. Sea-sand, which is thrown up in creeks and other places, is by much the richest of all sand for manuring the earth; partly its saltness, and partly the fat and unctuous filth that is mixed among it, give it this great virtue. In the western parts of England, that lie upon the sea-coast, they make very great advantages of it. The fragments of sea-shells also, which are always in great abundance in this sand, add to its virtues; and it is always the more esteemed by the farmers, the more of these fragments there are among it.

The sea-sand, used as manure in different parts of the kingdom, is of three kinds: that about Plymouth, and on other of the southern coasts, is of a blue-grey colour, like ashes, which is probably owing to the shells of muscles, and other fish of that or the like colour, being broken and mixed among it in great quantity. Westward, near the land's end, the sea-sand is very white, and about the isles of Scilly it is very glittering, with small particles of talc; on the coasts of the north-sea, the sand is yellowish, brown, or reddish, and contains so great a quantity of fragments of cockle-shells, that it seems to be chiefly composed of them. That sea-sand is accounted best, which is of a reddish colour: the next in value to this is the bluish, and the white is the worst of all. Sea-sand is best when taken up from under the water, or from sand-banks, which are covered by every tide. The small grained sand is most sudden in its operation, and is therefore best for the tenant who is only to take three or four crops; but the coarse or large grained sand is much better for the landlord, as the good it does lasts many years.

When the land has been well manured with the large sand, they take four crops of corn from it, and then lay it down for pasture for six or seven years before they plow it again. The grass is so good that they commonly mow it for hay the first year; it always abounds very much with the white flowered clover. If the grass grows but short, it is the farmer's interest to feed his cattle upon it, and it will turn to as good account this way, being very sweet and rich, and making the cattle fat, and the cows yield a very large quantity of milk.

SANDBACH, a market-town twenty-two miles east of Chester.

SAND-BAGS, in the art of war, are bags filled with earth or sand, holding each about a cubic foot: their use is to raise parapets in haste, or to repair what is beaten down.

SANDECK, a town of little Poland, thirty-five miles south-east of Cracow.

SAND-EEL, *ammodytes*, in ichthyology. See the article **AMMODYTES**.

SAND-FLOOD, a terrible mischief, incident to the lands of Suffolk, and some other parts of England; which are frequently covered with vast quantities of sand, rolling in upon them like a deluge of water, from sandy hills in their neighbourhood.

The best way of stopping its progress is, by hedges or furze, planted one over another as they become level.

SAND-LANDS, or **SANDY LANDS**, in agriculture, are made up of sands of different colours and quantities; as white, blackish, reddish, or yellowish; and in the size of their particles, some being milder or harsher, and others very light, seeming mere dust. The grey, black, and ash-coloured sands, are the worst of all, and are generally found on heaths and commons.

The most suitable plants for arable lands of this kind, are white oats, rye, black wheat, and turneps: the natural produce in weeds, is quick-grass, sorrel, broom, furze, fern, and heath. The best manure for them is either marl, or such clay as will break with the frosts. Cow-dung is also said to be good for such lands; and many use with success chalk, mud, and the half rotten straw of dunghills.

SANDAL, in antiquity, a rich kind of slipper, worn on the feet by the greek and roman ladies, made of gold, silk, or other precious stuff, consisting of a sole, with an hollow at one extreme to embrace the ankle, but leaving the upper part of the foot bare.

Sandal, is also used for a shoe or slipper worn by the pope, and other romish prelates, when they officiate. It is also the name of a sort of slipper worn by several congregations of reformed monks. This last consists of no more than a mere leathern sole, fastened with latches or buckles, all the rest of the foot being left bare. The capuchins wear sandals the recolects, clogs: the former are of leather, and the latter of wood.

SANDARACH, in natural history, a very beautiful native fossil, though too often confounded with the common factitious red arsenic, and with the red matter formed by melting the common yellow orpiment.

It is a pure substance, of a very even and regular structure, is throughout of the colour which our dyers term an orange-scarlet, and is considerably transparent even in the thickest pieces. But though with respect to colour, it has the advantage of cinnabar while in the mass, it is vastly inferior to it when both are reduced to powders. It is moderately hard, and remarkably heavy, and when exposed to a moderate heat, melts and flows like oil: if set on fire, it burns very briskly.

It is found in Saxony and Bohemia, in the copper and silver mines, and is sold to the painters, who find it a very fine and valuable red: but its virtues or qualities in medicine, are no more ascertained at this time, than those of the yellow orpiment.

Gum-SANDARACH, is a dry and hard resin, usually met with in loose granules, of the bigness of a pea, a horse-bean, or larger; of a pale whitish yellow, transparent, and of a resinous smell, brittle, very inflammable, of an acrid and aromatic taste, and diffusing a very pleasant smell when burning. It is produced from a species of the juniper, and the *cedrus baccifera*. See the article **JUNIPER**.

It flows only from these trees in hot countries; but the natives promote its discharge by making incisions in the bark.

What is obtained from the cedar is more fragrant, especially when burnt; but it is seldom to be met with separate in the shops, both being mixed together under the common name of sandarach.

Sandarach is good in diarrhoeas, and in hæmorrhages; where its dose is from ten grains to half a dram: it is also sometimes prescribed in gonorrhœas, and the fluor albus; but at present it is much disused in medicine. It is, however, much used by our writing-masters, who make a powder of it which they call pounce.

The varnish-makers make a kind of varnish of it by dissolving it in oil of turpentine, or linseed, or in spirit of wine. See the article **VARNISH**.

Gum-sandarach, on its being imported, pays

pays a duty of 5s. 5 $\frac{10}{100}$ d. the 112 pounds, and on exportation draws back 4s. 9 $\frac{12}{100}$ d.

ANDIVER, a whitish salt, continually cast up from the metal, as it is called, whereof glass is made; and swimming on its surface, is skimmed off. See the article **GLASS**.

Sandiver is also plentifully thrown out in the eruptions of volcanos; some is of a fine white, and others tinged bluish, or yellowish.

Sandiver is detergent, and good for foulnesses of the skin. It is also used by gilders of iron. See **GILDING**.

ANDIX, a kind of minium, or red-lead, made of ceruse; but much inferior to the true minium. See the articles **MINIUM** and **CERUSE**.

ANDOMIR, a city of little Poland, and capital of a Palatinate of the same name, eighty miles north-east of Cracow.

ANDVLIET, a town of Brabant, ten miles north of Antwerp.

AND-WALK. See the article **WALK**.

ANDWICH, one of the cinque-ports, in Kent, ten miles east of Canterbury: it sends two members to parliament, and gives the title of earl to the noble family of Montague.

ANE MEMORY, in law, denotes sound and perfect memory to do any lawful act. See the articles **MEMORY** and **COMPOS**.

ANGUessa, a town of Spain, twenty miles south of Pampeluna: west long. 1° 30', north lat. 42° 40'.

ANGUIFICATION, in the animal oeconomy, the conversion of chyle into true blood. See the articles **CHYLE**, **CHYLIFICATION** and **BLOOD**.

ANGUINARIA, **BLOOD-WORT**, a genus of the polyandria-monogynia class of plants, the flower of which consists of eight very patent petals; and the fruit is an oblong ventricose capsule, containing a great many roundish and acuminate seeds.

ANGUINE, in general, something abounding with, or resembling blood. See the article **BLOOD**.

Among heralds, the term *sanguine* is often given to the colour more usually called murrey; being made of red lake tinged with a little spanish brown; it is chiefly used in the coats of the knights of the bath, and is represented, in engraving, by hatches like those of purple. See the article **PURPURE**.

SANGUINE-STONE, *lapis hematites*. See the article **HÆMATITES**.

SANGUIS, **BLOOD**, in the animal oeconomy. See the article **BLOOD**.

SANGUIS DRACONIS, *dragon's-blood*, in pharmacy. See **DRAGON'S-BLOOD**.

SANGUIS HIRCI, *goat's blood*, in pharmacy, the dried blood of a middle-aged goat, which is esteemed in Germany as a sudorific, and a great medicine in pleurifies; but with us is little regarded.

SANGUISORBA, **BURNET**, in botany, a plant of the tetrandria-monogynia class, with a monopetalous flower, divided into four deep segments, cohering only at the ungues; the fruit is a small bilocular capsule, containing very small seeds.

The great burnet, *sanguisorba major*, is celebrated as a cordial, sudorific, and astringent; but though great cures are said to have been effected by it, the present practice neglects it.

SANGUISUGA, in zoology, a name given to the hirudo or leech. See the article **LEECH**.

SANHEDRIM, or **SANHEDRIN**, among the Jews, the great council of the nation, consisting of seventy senators, taken partly from among the priests and levites, and partly out of the inferior judges, who formed what was called the lesser sanhedrim. The room they met in, was a rotunda, half of which was built without the temple, and half within. The nasi, or president of the sanhedrim, sat upon a throne, with his deputy on his right hand, his sub-deputy on his left, and the other senators ranged in order on each side.

The authority of this council was very extensive, for they decided such causes as were brought before them by way of appeal from the inferior courts; and the king, the high-priests, and prophets were under the jurisdiction of this tribunal. They had the right of judging in capital cases, and sentence of death might not be pronounced in any other place; for which reason the Jews were forced to quit this hall, when the power of life and death was taken out of their hands, forty years before the destruction of the temple, and three years before the death of Christ.

There were several inferior sanhedrims in Palestine, each of which consisted of twenty-three persons; all these depended on the great sanhedrim of Jerusalem.

SANICLE, *sanicula*, in botany, a genus

of the pentandria-digynia class of plants, with an umbelliferous flower; each partial one being composed of five compressed and bihid petals; the fruit is composed of two seeds, plane on one side, and convex and scabrous on the other. See plate CCXXXVI. fig. 4.

The leaves of this plant have long been celebrated for their vulnerary qualities, both internally and externally; but are, nevertheless, disregarded by the present practitioners.

SANIDIUM, in natural history, the name of a genus of fossils, of the class of the selenitæ, but neither of the rhomboidal nor columnar kinds, nor any other way distinguishable by its external figure, being made up of several plain, flat plates. See the article **SELENITÆ**. The selenitæ of this genus are of no determinate form, nor consist of any regular number of planes or angles, but are merely flat, broad, and thin plates or tables, composed of other yet thinner plates, like the talcs, but distinguished from those bodies by this, that these plates are made up of arrangements of slender fibres, disposed obliquely, but in uninterrupted lines across the body. Of this genus there are only two known species, the one colourless and pellucid, the other whitish and opaque. The first is found pretty frequently about Oxford, as also in Northamptonshire, Yorkshire, and other counties; the other is very common in all parts of Germany, and is found also in Leicestershire, and some other parts of England, but with us about London it is not common.

SANIES, in medicine, a serous putrid matter, issuing from wounds; it differs from pus, which is thicker and whiter.

SAN MATHEO, a town of Spain, in the province of Valencia, fifty-five miles north of the city of Valencia.

SANQUHAR, a borough town of Scotland, in the county of Nithsdale, twenty-one miles north of Dumfries.

SANTA CLARA, an island in the Pacific Ocean, situated in the bay of Guyaquil: west long. 80°, south lat. 3° 15'.

SANTA CRUZ, a port-town on the north side of the island of Cuba, in North America: west long. 85° 30', north lat. 22° 30'.

SANTA FE, the capital of New Mexico: west long. 109°, north lat. 36°.

SANTA FE DE BAGOTA, the capital of Terra Firma, in South America: west long. 74°, north lat. 4° 35'.

SANTA MARIA, a town of Terra Firma in the province of Darien, situated on a river of the same name, a little east of the bay of Panama: west long. 80° north lat. 7° 40'.

SANTALUM, **SAUNDERS**, in the materia medica, a hard, odoriferous medicinal wood, brought from the East-Indies, of which there are three sorts, viz. the yellow, white and red: the yellow or citrine saunders, is a beautiful wood of the colour of lemon-peel; of a fine somewhat like a mixture of musk and roses, and of a somewhat acrid and aromatic taste, with a slight bitterness. The white saunders resembles the yellow, and is of the same fragrant smell and aromatic taste, but in a more remiss degree. Both these sorts should be chosen sound, firm, heavy, and of a good smell when cut; they should also be chosen in the block, and not cut into chips as they usually are, for in this manner they lose much of their virtue. The red saunders is of a dense and compact texture, remarkably heavy and very hard. It is brought to us in logs of considerable length, the out part of which is a dusky, and the inner of a blood red: it has but little smell, and is of an austere taste.

All these sorts are attenuants, and have an astringency, but the red most of all. They are accounted cordials, and are said to be good in obstructions of the viscera; but they are little used, except as ingredients in some of the composition of the shops.

Santalum is a plant of the octandria-monogynia class, with a monopetalous campanulated flower, and a berry for its fruit.

SANTAREN, a city of Portugal, in the province of Estremadura, situated on the river Tagus, fifty miles north-east of Lisbon.

SANTEN, a town of Germany, in the circle of Westphalia and dutchy of Cleve, fifteen miles south-east of the city of Cleve, subject to Prussia.

SANTERRE, the southern division of Picardy, in France.

SANTILLANA, a city and port-town of Spain, the capital of the eastern Asturias, situated on the bay of Biscay: west long. 5°, and north lat. 43° 35'.

SANTOLINA, **FEMALE SOUTHERN WOOD**, or **LAVENDER-COTTON**, a plant of the syngenesia polygamia class, the compound flower of which is uniform, consisting of a number of infundibuliform

herma

hermaphrodite corollulæ, quinquifid at the limb; which are each followed by a single seed, contained in the cup.

The medicinal virtues ascribed to *santolina*, are, in general, the same with those of the *abrotanum mas*, or male southern-wood: it is however particularly recommended in uterine complaints; and its seed is good for destroying worms. See the article *SOUTHERN-WOOD*.

SANTOLINOIDES, or **ANACYCLUS**, in botany, a plant nearly allied to the *cotula*, the compound flower of which is radiated; the disc being occupied by funnel-shaped hermaphrodite corollulæ, quinquifid at the limb; and the female flowers are ligulated; there are five capillary and very short stamina; and the seeds are single, after each partial flower.

SANTORINI, an island of the Archipelago, thirty-five miles in circumference: east long. $25^{\circ} 35'$, north lat. $36^{\circ} 10'$.

SAONE, a river of France, which rises in Lorrain, and falls into the Rhone, at Lyons.

SAP, in physiology, a juice furnished by the earth, and changed into the plant, consisting of fossil parts, other parts derived from the air and rain, and others from putrified animals, plants, &c. See the article *JUICE*.

This juice enters the plant in form of a fine and subtle water, which the nearer it is to the root, the more it retains of its proper nature; and the farther from the root, and the more action it has sustained, the nearer it approaches to the nature of the vegetable: consequently, when the juice enters the root, it is earthy, watery, poor, acid, and scarcely oleaginous at all. In the trunk and branches it is farther prepared, though it still continues acid, as we find by tapping a tree in the month of February. The sap being here carried to the germs or buds, is more concocted; and here having unfolded the leaves, these come to serve as lungs for the circulation and farther preparation of the juice. By such means is the sap still farther altered and digested, as it is farther in the petals or leaves of the flowers, which transmit the juice, now brought to a farther subtility, to the stamina; these communicate it to the farina, or dust, in the apices, which is, as it were, the male seed of the plant; where, having undergone a farther maturation, it is shed into the pistil, which performs the office of an *uterus* or womb: and thus having ac-

quired its last perfection, it gives rise to a new fruit or plant. The sap having thus gone its stage, from the root to the remote branches, and even the flower; and having, in every part of its progress, deposited something both for aliment and defence, what is redundant passes out into the bark, the vessels of which are inoculated with those in which the sap mounts; and through which it descends to the root, and thence to the earth again. And thus a circulation is effected. See the article *CIRCULATION*.

SAP, or **SAPP**, in the art of war, is the digging deep under the earth of the glacis, in order to open a covered passage into the moat. It is only a deep trench, covered at top with boards, hurdles, earth, sand-bags, &c. and is usually begun five or six fathoms from the salient angle of the glacis. See the articles *FORTIFICATION* and *APPROACHES*.

SAPHENA, in anatomy, a vein which arising over the malleolus internus up along the leg and the inner-part of the thigh, discharges itself near the groin into the crural vein. It is this vein they usually open when they bleed in the foot for suppressions of the menses. See the article *PHLEBOTOMY*.

SAPHETA, in architecture, is the board over the top of a window, placed parallel and opposite to the window stool at the bottom.

SAPIENTIAL, an epithet applied to certain books of scripture, calculated for our instruction and improvement in prudence or moral wisdom, thus called in contradistinction to the historical and prophetical books. See *BIBLE*, &c.

The sapiential books are Proverbs, Canticles, Ecclesiastes, the Psalms, and Job; though some reckon this last among the historical books. See the articles *HAGIOGRAPHIA*, *CANTICLES*, &c.

SAPIENTIAE dentes, in anatomy, the two last or inmost of the dentes molares of the upper jaw, one on each side, thus called because they appear not till persons are grown. See the article *TOOTH*.

SAPIENZA, an island and cape in the mediterranean sea, on the south-west point of the Morea, east long. $21^{\circ} 15'$, north lat. $36^{\circ} 45'$.

SAPPIC, in poetry, a kind of verse much used by the Greeks and Latins, denominated from the inventress Sappho. The sapphic verse consists of five feet, whereof the first, fourth and fifth are trochees,

trochees, the second a spondee, and the third a dactyl; as in.

1	2	3	4	5
<i>Aure-</i>	<i>am quis</i>	<i>quis medi</i>	<i>ocri-</i>	<i>talem</i>
<i>Dili-</i>	<i>git, tu-</i>	<i>tus caret</i>	<i>obfo-</i>	<i>leti</i>
<i>Sordi-</i>	<i>bus te-</i>	<i>ti, caret</i>	<i>invi</i>	<i>denda.</i>

and after every three sapphic verses, there is generally subjoined an adonic verse, as

Sobrius aulâ.

See the article ADONIC.

SAPINDUS, the SOAPBERRY-TREE, in botany, a plant of the oclandria-digynia class, the flower of which consists of four oval petals; and the fruit of three capsules, each including a globose nut.

The berries of this tree are used for washing, instead of soap, whence the english-name.

SAPO, SOAP. See the article SOAP.

SAPONARIA, SOAPWORT, in botany, a plant of the decandria-digynia class, the flower of which consists of five petals, with a plane limb; and its fruit an unilocular capsule, containing a number of small seeds.

The root of this plant is accounted aperient, corroborant, and sudorific; and even preferred by some to sassafras in these intentions. The leaves, agitated with water, raise a saponaceous froth, which has nearly the same effects with solutions of soap itself, in taking out spots from cloaths, whence the name.

SAPPHIRE, a pellucid gem, which, in its finest state, is extremely beautiful and valuable, and second only to the diamond in lustre, hardness, and price. Its proper colour is a pure blue; in the finest specimens it is of the deepest azure, and in others varies into paleness in shades of all degrees between that and a pure crystal brightness and water, without the least tinge of colour, but with a lustre much superior to the crystal. They are distinguished into four sorts, *viz.* the blue sapphire, the white sapphire, the water sapphire, and the milk sapphire.

The gem known to us by this name is extremely different from the sapphire of the ancients, which was only a semi-opaque stone, of a deep blue, veined with white, and spotted with small gold-coloured spangles, in the form of stars, and was only a more beautiful kind of the lapis lazuli; but our sapphire they have described under the name of beryllus aeroides, or the sky-blue beryl.

The finest sapphires in the world are

brought from the kingdom of Pegu, in the East-Indies, where some are found perfectly colourless, and others of all the shades of blue; these are all found in the pebble-form. We have very fine sapphires also, partly pebble, partly crystal-shaped, from Bishnagar, Conanor, Calicut, and the island of Ceylon: these also are of all the shades of blue. And in Ceylon there are sometimes found a sort of bastard gems, of a mixed nature between the sapphire and ruby. The occidental are from Silesia, Bohemia, and many other parts of Europe; but though these are often very beautiful stones, they are greatly inferior, both in lustre and hardness, to the oriental.

The sapphire is said to have very great virtues as a cordial, sudorific, and alexipharmic; but we have no good testimony of any body's having ever found this by experiment.

For the manner of making counterfeit sapphires, see the article *Imitation or counterfeiting of GEMS in glass.*

SAPPHIRINE WATER, in the materia medica, also called blue eye-water, is thus prepared: pour a pint of lime-water, made strong and fresh, into a copper-veffel, add to it a dram of crude sal armoniac, and throw in some filings or small pieces of copper, and let it stand till it has acquired a beautiful colour.

This is used as an eye-water; as also to deterge old ulcers: and sometimes it is mixed with other things in injections in gonorrhœas.

SAQUEM, a port-town situated on the Red-sea, in the province of Abex, in Africa: east long. 38° 30', and north lat. 19°.

SAR, a river in Germany, which rises in Alface, and falls into the Moselle, a little above Triers.

SARABAITES, a sort of monks among the ancient christians, who did not resort to the wilderness as others did, but lived publicly in cities. Two or three of them usually dwelt together, but they had no rule or government; they however observed very strict fasts; wore loose sleeves, wide stockings, coarse cloaths, frequently sighed, and always bitterly inveighed against the clergy.

SARABAND, a musical composition in triple time, the motions of which are slow and serious.

Saraband is also a dance to the same measure, which usually terminates when the hand that beats rises; by which it is distinguished

tinguished from a courant, which ends when the hand that beats the time falls ; and is otherwise much the same as the minuet.

The saraband is said to be originally derived from the Saracens, and is usually danced to the sound of the guitar or castanettes.

SARACENS, the inhabitants of Arabia ; so called from the word *sara*, which signifies a desert, as the greatest part of Arabia is : and this being the country of Mahomet, his disciples were called Saracens.

SARAGOSSA, the capital of the province of Arragon in Spain : west long. $1^{\circ} 15'$, and north lat. $41^{\circ} 32'$.

SARCASM, in rhetoric, a keen bitter expression which has the true point of satyr, by which the orator scoffs and insults his enemy : such was that of the Jews to our Saviour, He saved others, himself he cannot save.

SARCOCELE, in surgery, a spurious rupture, or hernia, wherein the testicle is considerably tumified or indurated, like a scirrhus, or much enlarged by a fleshy excrescence, which is frequently attended with acute pains, and sometimes ulceration, so as to degenerate at last into a cancerous disposition. See **HERNIA**.

When the tumour of the testicle is accompanied with hardness, the causes are much the same with those of a scirrhus. When there is a fleshy excrescence, then the cause is usually some contusion or other external violence. The tumour differs as to its magnitude, being frequently no larger than a hen's egg, tho' sometimes as big as a man's fist. The signs whereby the sarcocele may be distinguished from other ruptures are principally the hardness of the tumour, and its seat being in the testicle ; whereas the true herniæ are distinct from the testicle, and softer to the touch. If a sarcocele be not timely brought to a suppuration, it very easily degenerates into a cancer ; and if both testicles are affected, castration is often necessary ; but if the tumour proceeds through the unguen, up to the abdomen, even castration will be useless, and death is the consequence.

A recent sarcocele, according to Heister, may frequently be suppurated by digestive medicines, as well internal as external. When these medicines prove ineffectual, the size and pain of the tumour increase, and it seems inclined towards a cancerous disposition, if it has not reached the ring

of the abdominal muscles, there is then but one way left of relieving the patient, and that is by a dextrous and timely extirpation of the disordered testicle, or both if they are affected, which is termed castration, and renders the patient impotent.

In this operation the spermatic vessels are first to be tied securely, with a ligature near the inguen, and afterwards divided, to give the patient less pain ; and as a division of these vessels, which are so much enlarged, may be attended with a fatal hæmorrhage, it may be prudent, for the greater security, to pass a double ligature round those vessels, one below the other ; or else not to extirpate the testicle so soon as it is freed from the scrotum, and its vessels strictly tied, but to wait a few days, till the testicle begins to grow flaccid and mortifies, which is a sign the spermatic vessels are well secured, and may be divided without any danger ; but if that does not follow, the ligature is not strict enough, and another must be made much tighter.

If a patient should be troubled with a fleshy excrescence upon his testicle, which is in other respects sound, and finds no relief from medicines, the testicle may be preserved, and yet the patient freed from his disorder, by opening the scrotum, and extirpating the offending part only.

With regard to the dressing, it is to be done with scraped lint and compresses, and secured by a proper bandage ; and to abate the inflammation, which sometimes arises, a discutient cataplasm may be used, and the wound afterwards treated with some digestive ointment of vulnerary balsam. See **WOUND**.

SARCOCOLLA, in pharmacy, a gum-resin, which approaches greatly to the nature of the simple gums. See the articles **GUM** and **RESIN**.

It is brought to us from Persia and Arabia, in small granules, moderately heavy, and of a whitish, brownish, or reddish colour, very friable, of a faintish disagreeable smell, and of an acrid and nauseous taste.

Hoffman absolutely condemns the internal use of it. However it is recommended in ophthalmias, and defluxions of a sharp matter upon the eyes ; and is generally ordered to be dissolved in milk for this purpose.

SARCOLOGY is that part of anatomy which treats of the soft parts, *viz.* the muscles, intestines, arteries, veins, nerves, and

and fat. See **MUSCLE**, **INTESTINES**, &c.
SARCOMA, in surgery, denotes any fleshy excrescence. See **EXCRESCENCE**.

Sarcomata of the nose, eyes, &c. may be sometimes removed by caustics; but the extirpating them with the knife or scissars is the safest and most eligible method. The wound should be suffered to bleed a while, after which it may be washed with collyrium made of aloes, tully, and sugar of lead, mixed in rose-water.

SARCOPHAGOUS MEDICINES, in surgery, &c. are those which eat away proud flesh, and otherwise called caustics. See the article **CAUSTICS**.

SARCOTICS, in surgery, medicines which generate flesh in wounds. See the articles **WOUND** and **VULNERARY**.

SARCULATION, in the antient agriculture, a kind of hoeing, used to root up the weeds in the peas, &c.

SARDA, the **PILCHARD**, in ichthyology. See the article **PILCHARD**.

SARDA, the **CARNELIAN**, in natural history. See the article **CARNELIAN**.

SARDACHATES, a beautiful species of agat, of a cloudy and spotted flesh colour. See the article **AGAT**.

SARDAM, a port-town of Holland, situated on the north-side of the Wye, seven miles north-west of Amsterdam.

SARDINIA, an island of the Mediterranean, situated between 8° and 10° east long. and between 39° and 41° north lat. It is about one hundred and forty miles long, and sixty broad; and gives the title of king to the duke of Savoy, under whose dominion it is.

SARDIS, the antient capital of Lydia, in Asia, now in ruins.

SARDONYX, in natural history, a genus of semi-pellucid gems, of the onyx-structure, zoned or tabulated, and composed of the matter of the onyx variegated with that of the red or yellow carnelian. See the articles **CARNELIAN** and **ONYX**.

Of this stone there are several beautiful species; as, 1. The thin zoned red sardonyx; or whitish onyx with thin snow-white and red zones. 2. The broad zoned red sardonyx; or horny onyx, with punctuated zones. 3. The horny onyx, with whitish and yellow zones; and is properly the yellow sardonyx and the chrysolite onyx of the antients. 4. The orange-coloured sardonyx; or bluish white onyx, with orange-coloured and whitish zones.

SARFE, in ichthyology, a species of cy-

prinus, with the iris of the eye and the fins and tail red. See **CYPRINUS**. This is a large species, and somewhat resembles the roach, but it is narrower in proportion to its length, being, when full grown, ten inches long, and no more than three in breadth in the largest part.

SARGUS, in ichthyology, one of the species of sparus, which have the teeth in the jaws broad. See the article **SPARUS**.

The fargus is the yellow sparus with black annular mark at the tail.

SARK, a little island between Guernsey and Jersey, subject to Great Britain.

SAROTHRA, in botany, a genus of the pentandria-trigynia class of plants, the calyx of which is a single-leaved, erect permanent, perianthium, divided into four linear acute segments; the corolla consists of five linear, spear-shaped, acute, deciduous petals, somewhat longer than the cup; the fruit is an oblong, acute, coloured capsule, containing only one cell with three valves; the seeds are numerous, very small, and kidney-shaped.

SARPLAR of wool, the same with a pocket or half a sack.

SARRACENA, in botany, a plant of the polyandria-monogynia class, with a roseaceous flower, consisting of five oval petals; the fruit is a roundish capsule containing a great many roundish seeds.

SARRASIN, or **SARRAZIN**, in fortification, the same with herse. See the article **HERSE**.

SARRITION, in the antient husbandry the same with what we call hoeing. See the article **HOEING**.

SARSAPARILLA, in pharmacy, the root of the rough smilax of Peru, consisting of a great number of long strings hanging from one head: these long roots the only parts made use of, are about the thickness of a goose-quill, or thicker, flexible, and composed of fibres running their whole length: they have a bitterish but not ungrateful taste, and no smell; and as to their medicinal virtues, they are sudorific and attenuant, and should be given in decoction, or by way of diet-drink.

SARSINA, a town of Romania, in Italy, twenty-three miles south of Ravenna.

SARTORIUS, in anatomy, is both an abductor and elevator, serving to move the legs upwards and forwards, determining them to cross each other, as tailors sit with them, whence the name; it rises from the internal part of the anterior and superior

superior spine of the ileum ; and descending obliquely, is inserted into the upper and inner part of the tibia.

SARUM, or **OLD SARUM**, a borough-town of Wiltshire, situated a little north of Salisbury.

It sends two members to parliament.

SASSAFRAS, in pharmacy, the wood of an american tree, of the laurel-kind, imported in large straight blocks : it is said to be warm, aperient, and corroborant ; and frequently employed, with good success, for purifying and sweetening the blood and juices ; for which purpose an infusion, in the way of tea, is a very pleasant drink : its oil is very fragrant, and possesses most of the virtues of the wood.

It is an excellent diuretic and diaphoretic, and therefore good in obstructions of the viscera, cachexies, scorbutic complaints, and in the venereal disease.

SASSARI, a town of Sardinia, sixty-five miles north of Oristagni.

SAS VAN GHENT, a town of Dutch Flanders, twelve miles north of Ghent.

SATELLITE, in astronomy, the same with a secondary planet, or moon ; so called from its continually waiting upon or revolving round one of the primary planets. See the article **PLANET**.

Thus the moon may be called the satellite of the earth : but the term is chiefly applied to the new-discovered planets, which make their revolution about saturn and jupiter. See the articles **MOON**, **JUPITER**, and **SATURN**.

SATIR, **SATIRE**, or **SATYR**. See **SATYR**.

SATISFACTION, in law, is the giving a recompence for some injury done ; or the payment of money due on bond, judgment, &c.

SATRAPA, or **SATRAPES**, in persian antiquity, denotes an admiral ; but more commonly the governor of a province.

SATTIN, a glossy kind of silk stuff, the warp of which is very fine, and stands out so as to cover the coarser woof.

Some sattins are quite plain, others wrought ; some flowered with gold or silver, and others striped, &c.

The chinese sattins are most valued, because of their cleaning and bleaching easily, without losing any thing of their lustre : in other respects they are inferior to those of Europe.

SATTINET, a slight thin kind of sattin, commonly striped, and chiefly used by the ladies for summer night-gowns.

SATURANTS, in pharmacy, the same

with absorbents. See **ABSORBENTS**.

SATURATION, in chemistry, is the impregnating an acid with an alkali, or *vice versa*, till either will receive no more, and the mixture will become neutral.

SATURDAY, the seventh or last day of the week, so called from the idol Seater, worshiped on this day by the antient Saxons, and thought to be the same as the Saturn of the Latins. Saturday answers to the jewish sabbath. See **SABBATH**.

SATUREIA, **SAVORY**, in botany, a genus of the didynamia-angiospermia class of plants, with a monopetalous ringent flower, and no pericarpium ; the seeds, which are four and roundish, being contained in the bottom of the cup.

The leaves of summer-savory are very pungent, warm, and aromatic ; and afford, in distillation with water, a subtile essential oil. Both are esteemed good in crudities of the stomach, asthmas, and menstrual obstructions.

SATURN, Υ , in astronomy, the remotest of the superior planets, which, by reason of its great distance from the sun, shines but with a feeble light. See **PLANET**.

Though Galileo's telescope was sufficient to discover all jupiter's moons, it could not reach saturn's, on account of their great distance ; but yet this sagacious observer found saturn, by reason of his ring, had a very odd appearance ; for his glass was not good enough to exhibit the true shape of a ring, but only a confused idea of that and saturn together, which, in the year 1610, he advertised in the letters of this sentence transposed : " Altissimum planetam tergeminum observavi ;" i. e. I have observed saturn to have three bodies.

This odd phenomenon perplexed the astronomers very much, and various hypotheses were formed to solve it ; all which appeared trifling to the happy Huygenius, who applied himself purposely to improve the grinding of glasses, and perfecting long telescopes, to arrive at a more accurate notion of this planet and its appendage. Accordingly, in 1655, he constructed a telescope of twelve feet ; and viewing saturn divers times, he discovered something like a ring encompassing his body ; which afterwards, with a tube of twenty-three feet, he observed more distinctly, and also discovered a satellite revolving about the planet. This huygenian satellite is the fourth in order from saturn. See plate CCXXXVI. fig. 5.

In the year 1659, Huygens published his discovery

discovery in relation to saturn's ring, in the letters of this sentence transposed. "Annulo cingitur tenui plano, nusquam coherente, ad eclipticam inclinato;" i. e. saturn is encompassed by a thin plane ring, no where cohering to his body, and inclined to the plane of the ecliptic. This inclination of the ring to the ecliptic is determined to be about 31 degrees by Huygens, Romer, Picard, Campani, &c. tho' by a method not very definitive. However, since the plane of the ring is inclined to the plane of the earth's motion, it is evident, when saturn is so situated that the plane of this ring passeth through the earth, we can then see nothing of it; nor can we see it when the plane passes between the sun and the earth, the dark side being then turned to us, and only a dark list appearing upon the planet, which is probably the shadow of the ring. In other situations the ring will appear elliptical, more or less; when it is most so, the heavens appear through the ecliptic space on each side saturn (which are called the anæ), and a fixed star was once observed by Dr. Clarke's father in one of them.

The nodes of the ring are in $19^{\circ} 45'$ of virgo and pisces. During saturn's heliocentric motion from $19^{\circ} 45'$ to the opposite node, the sun enlightens the northern plane of the ring.

Since saturn describes about one degree in a month, the ring will be visible thro' a good telescope till within about fifteen or twenty days before and after the planet is in $19^{\circ} 45'$ of virgo or pisces. The time therefore may be found by an ephemeris, in which saturn, seen from the earth, shall be in those points of the ecliptic; and likewise when he will be seen from the earth in $19^{\circ} 45'$ of gemini and sagittarius, when the ring will be most open, and in the best position to be viewed.

There have been some grounds to conjecture that saturn's ring turns round an axis; but that is not yet demonstrable. This wonderful ring, in some situations, does also appear double; for Cassini, in 1675, observed it to be dissected quite round by a dark elliptical line, dividing it, as it were, in two rings, of which the inner one appeared brighter than the other. This was oftentimes observed afterwards, with tubes of thirty-four and twenty feet, and more evidently in the twilight or moon-light, than in a darker sky. This ring is the most remarkable thing in

the whole planetary system, there being nothing of that nature hitherto discovered in any of the other planets. Kepler, in his Epitom. Astron. Copernic. and after him Dr. Halley, in his enquiry into the causes of variation of the needle, Philos. Transact. n^o 195, suppose our earth may be composed of several crusts or shells, one within another, and concentric to each other. And if so, then it is possible the ring of saturn may be the fragment or remaining ruins of his formerly exterior shell, the rest of which is broken or fallen down upon the body of the planet. And if saturn ever had such a shell round it, its diameter would then have appeared as big to an eye at the sun, as that of jupiter doth now, when seen from thence. Since the outward margin of the ring is distant from saturn $2\frac{1}{4}$ of saturn's semidiameter, this cannot be seen at the distance of 64 degrees from saturn's equator, in whose plane the ring is placed. Therefore, a spectator, placed in a latitude higher than that, can never see the ring at all; so that there is a zone of almost 53 degrees broad towards either pole, to whom this famous ring can never appear. And as the spectator shall move nearer the pole, first one, then the second satellite, next the third and fourth, and, when he is come within one degree of the pole, even the fifth satellite cannot be seen, unless by refraction; and, in the winter-time, neither sun moon nor any planet will be there visible, unless perhaps a comet.

If the eye be supposed to be placed in the equator of saturn, or in the zone nearly adjoining, it can never see those stars that are in or very near the equator, nor any one of the satellites; because the ring will always hide them; and then at the equinoxes it cannot see the sun; and if it were any where else placed, it could not then see the ring; because neither of its faces will then appear illuminated by the sun. The breadth of this ring it is hard to determine from our earth, because its thickness is so small; but Mr. Huygens makes it to be about 600 german miles. For one half of saturn's year (viz. fifteen of ours) only one face of the ring will be enlightened by the sun; whence the inhabitants, which may be supposed to live in that hemisphere to which this face of the ring is turned, or to whom it is summer, will see that part of the ring which is above their horizon, shining faintly by day, as our moon doth when

the sun is above our horizon, but brighter and stronger by night, as our moon doth in the sun's absence: and, after sun-set, the eastern part of this enlightened arch will fall within the shadow of saturn; which shade will ascend, as night comes on, and at night will be at the highest; and then will descend again towards the western part of the ring, according as the sun comes more and more to the eastward.

This enlightened arch will always shew how to describe a meridian line; for a plane perpendicular to the horizon, and passing through the vertex of the arch, will be in the true meridian.

To an eye placed any where without, and at less than fifty degrees distant from the equator, this enlightened arch of the ring will appear concave as well as convex, like a kind of furnace or vault, rising above the horizon: but to an eye more than 52 minutes, and less than 64 degrees, distant from the equator, the hollow or concave part will not be visible; but there will appear a brightish body arising, as it were out of the ground, and contiguous to the horizon.

For the other half of saturn's year, while the sun declines towards the depressed pole, or during the fifteen years winter, the ring will not be visible, as having not that face illuminated which is turned to the spectator's eye; but, however, will render itself sensible, by covering from the sight such stars and parts of the heavens as are opposite to it, or apparently behind it. The shade of the ring also will be extended more and more towards the nearer pole; so that to an eye placed any where within the aforesaid space, the sun, when he attains such a certain declination, will appear to be covered or eclipsed just at noon, and then straight to emerge out of the shadow. The next day, the like phenomenon will happen, but the eclipse will begin sooner, and will be over later: and these meridian eclipses will daily increase in their duration until the middle of winter; and then they will decrease again gradually, till at last they will come to nothing again, *viz.* when the sun, returning from the tropic, hath the same declination as he had when these meridional eclipses began.

And this will happen, if an eye be placed in any latitude greater than 25 or 26 degrees; but if in a latitude less than this, when the meridional darkness is of

the greatest duration, the sun will suddenly appear just in the meridian, and then straightway will be eclipsed again. The next day there will appear the like sort of light, but it will last longer; and this meridian light will grow still longer and longer in duration, till mid-winter, and then, like the darkness above-mentioned, it will be continually decreasing, until it quite disappear.

And from hence it is plain, that there is the greatest difference between summer and winter in the globe of saturn, of all the other planets; and this both on the account of the long duration of each, and the great declination of the sun from the equator; and also by reason of these meridional darknesses of the winter, arising from the ring's eclipsing the sun.

If an eye were placed in saturn, the diameter of the sun would appear almost ten times less than it doth to us; and consequently his disc, light, and heat will be there ninety times less. Saturn's year is almost thirty of ours; but the length of his day is yet uncertain, because the time of his revolution round his axis is not yet known; but Mr. Huygens judges they are longer than the days of jupiter. That great astronomer supposeth the axis of saturn to be perpendicular to the plane of his ring, and of the orbits of the satellites: if so, then there will be the same position of the equator and poles, as to the fixed stars, as there is in our earth; the same pole-star and the fixed stars will appear to rise and set after the same manner, in the same latitudes. There is a vast inequality, in the length of the day, in several parts of this planet; and as great a diversity of summer and winter; which depends on the quantity of the inclination of the plane of the quator to the plane of the orbit of saturn round the sun, which Huygens makes to be 51 degrees, which is almost one third more than our earth, where yet the differences and variety of seasons and weather are very sensible. For in saturn, in the latitude of 50 degrees, the longest day will have no night at all, and the longest night will have no day. And the two frigid zones will be each of them 62 degrees broad, at least ten times as large as the whole surface of our earth. The eye thus placed will be able to discern none of the planets but jupiter, which will appear always to accompany the sun, and never to be from him above 37 degrees.

The parallax of the sun in saturn is but

nine seconds, and therefore insensible; but the parallaxes of all his moons or satellites are very considerable, and therefore their distances from him will be easily computable.

For the other particulars relating to the astronomy of saturn, see PLANET, COPERNICAN, DIAMETER, DISTANCE, INCLINATION, PERIOD, &c.

Satellites of SATURN, are five moons; the first or inmost of which revolves about saturn in 1 day, 21 hours, and 18 minutes, at the distance of near two semi-diameters of the ring; the second in 2 days, 17 hours, and 41 minutes, at the distance of $2\frac{2}{3}$ semi-diameters; the third, in 4 days, 12 hours, and 25 minutes, at the distance of $3\frac{2}{3}$ semi-diameters; the fourth, in 15 days, 22 hours, and 41 minutes, at the distance of 8 semi-diameters; and the fifth, in 70 days, 22 hours, and 4 minutes, at the distance of $23\frac{1}{10}$ semi-diameters of saturn's ring.

In the beginning of the year 1665, the celebrated Mr. Huygens, as already observed, discovered the biggest of saturn's satellites; the other four satellites of saturn were all the discovery of Mr. Cassini, the third and fifth in the years 1671, 1672, and 1673; but the first and second were not discovered till the year 1684, by extraordinary telescopes of eighty, one hundred, one hundred and fifty, and two hundred feet in length.

SATURN, in chemistry, &c. an appellation given to lead. See LEAD.

SATURN, in heraldry, denotes the black colour, in blazoning the arms of sovereign princes. See the articles SABLE, COLOUR, and BLAZONING.

SATURNALIA, in roman antiquity, a festival observed about the middle of December, in honour of the god Saturn, whom Lucan introduces, giving an account of the ceremonies observed on this occasion thus: "During my whole reign, which lasts but for one week, no public business is done; there is nothing but drinking, singing, playing, creating imaginary kings, placing servants with their masters at table, &c. There shall be no disputes, reproaches, &c. but the rich and poor, masters and slaves, shall be equal," &c.

On this festival the Romans sacrificed bare-headed, contrary to their custom at other sacrifices.

SATURNINE, an appellation given to

persons of a melancholy disposition, 29 being supposed under the influence of the planet saturn. See MELANCHOLY.

SATYR, in the heathen mythology, a fabulous kind of demi-god, or rural deity, of the antient Romans, represented with goat's feet, and sharp pricked up ears.

Some think the notion of these satyrs might have been derived from the monkeys known at present under the same name. See the article MONKEY.

SATYR, or *SATIRE*, in matters of literature, a discourse or poem, exposing the vices and follies of mankind.

The satyr of the Greeks differed from that of the Romans, as being a kind of interlude annexed to tragedy, with a view to remove from the audience too melancholy impressions. But satyr, as we now have it, is entirely roman, if we may believe Quintilian, who says, "*Satira quidem tota nostra est*;" or Horace, who styles Ennius the inventor of a poem, unknown to the Grecians, meaning satyr, according to the opinion of all his interpreters. Scaliger however expressly denies it to be of roman original; and there is reason, indeed, as we shall see hereafter, to understand these expressions of Quintilian and Horace with some abatement. Those that will not allow it to be derived from the Grecians, but entirely roman, maintain that satyr should be writ with an *i*, not a *y*; and that it is not derived from *satyrus*, but *satur*; *satira* therefore is the same as *satura*, as *maximus* antiently *maximus*.

When the Romans grew more polite, these kind of verses refined in proportion, but they still retained their jibes and banter, and kept so far to their first institution, as to make the follies of human life the object of their ridicule. From hence proceeded satyr, so called from the sarrago and variety of matter it contained. It was improved likewise with music and dancing, which, considering its being carried on in dialogue, made it resemble somewhat of the dramatic kind; nor had the Romans any thing that came so near the drama as this did. Afterwards when they had received both tragedy and comedy from the Grecians, they were so taken with the novelty, that satyr for some time lay neglected: but coming again into esteem, it was added as a kind of exodium to comedy. Thus things went on for some years till Ennius arose, endued with wit and true poetic fire, who

observing

observing how fond the people were of seeing the vices of mankind exposed upon the stage, thought a poem or the said subject, without the decoration of scenes and action, might have the same effect. Accordingly he attempted satyrs in the same form we now see them, only he did not confine himself to the hexameter, but made use of all sorts of measure. The remains we have of this poet are noble indications of the strength of his genius; and Horace and Virgil have shewn what opinion they had of his writings, by borrowing so much from them. After Ennius succeeded Pacuvius; but his works are all lost, excepting some fragments, and those of uncertain authority. Next came Lucilius, of whom also we have some fragments remaining; but his excellencies and imperfections are very amply set forth by Horace, whose words we have no occasion to cite here.

It must be allowed however, that one species of satyr owes its perfection to Horace, as another does to Juvenal. A third kind was the varronian or menippean satyr, so called from Menippus, a cynic philosopher among the Grecians, whose doctrine Varro followed. It was a sort of medley, consisting of not only all kinds of verse, but of verse and prose mixed together; a specimen of which we have in Petronius's Satyricon. We have none of Varro's poetical works remaining, except some small fragments; which is the more to be lamented, considering the character Quintilian gives of him, that he was the most learned of all the Romans.

The word satyr was antiently taken in a less restrained sense than it is at present, not only as denoting a severe poem against vice, but as consisting of precepts of virtue, and the praises of it: and even in the satyrs, as they are called, of Horace, Juvenal, and Persius, &c. which are principally levelled against the weakness, the follies, or vices of mankind, we find many directions, as well as incitements, to virtue. Such strokes of morality Horace is full of; and in Juvenal they occur very frequently. All of them, sometimes, correct vice like moralists; we may say, like divines rather than satyrists. With respect to the nature and different species of it, satyr, in general being a poem designed to reprove the follies and vices of mankind, is twofold; either the jocular, as that of Horace; or the

serious, like that of Juvenal; the former hidden, the latter open: that generally makes sport with vice, and exposes it to ridicule; this probes it to the bottom, and puts it to the torture: and so far is it from not deserving the title of satyr, as some pretend, that it seems rather a more noble species of it; and the genteel strokes of Horace, how ingenious soever, are less affecting than the poetic rage and commendable zeal of Juvenal.

They both agree in being pungent and cutting, yet are distinguished by very evident marks. The one is pleasant and facetious, the other angry and austere: the one smiles; the other storms: the foibles of mankind are the object of one; greater crimes of the other: the former is always in the pleasing style; the latter generally in the sublime: that abounds with wit only; this adds to the salt bitterness and acrimony. Either kind of satyr may be writ in the dialogue or epistolary manner; and we have instances of both forms in Horace, Juvenal, and Persius. As some of Horace's, which are called satyrs, are as truly epistles; so many of his epistles might as well be called satyrs: for example, *Qui fit Mæcenas*, &c. might, with equal reason, be reckoned among the epistles; and *Prima dicte mihi*, &c. among the discourses or satyrs; if the author or editor had so thought fit.

The chief satyrists among the antients are Horace, Juvenal, and Persius; those among the moderns, Regnier, and Boileau, in French; and Dryden, Oldham, Rochester, Buckingham, Pope, Young, &c. among the English.

SATYRIUM, GOAT'S STONES, a genus of the gynandria-diandria class of plants, the flower of which consists of five ovato-oblong petals; and its fruit is an oblong, unilocular capsule, containing a great many scabiform and very small seeds.

The root of this plant is composed of two oval bulbs, of a whitish colour, a sweetish taste, and a faint unpleasant smell: it abounds with a glutinous slimy juice; and, like other mucilaginous vegetables, it serves to thicken the thin serous humours, and defend the solids from their acrimony: it has also been celebrated, though on no very good foundation, for analeptic and aphrodisiac virtues; in which intentions it has also been frequently used.

SAVANNA,

SAVANNA, a town and river of Georgia, in North-America : west longitude $81^{\circ} 20'$, north latitude 32° .

SAVANT, or **SCAVANT**. See **SCAVANT**.

SAUCISSE, or **SAUSAGE**, in the military art, a long train of powder, sewed up in a roll of pitched cloth, about two inches in diameter, serving to set fire to mines. See the article **MINE**.

There are usually two saucisses extended from the chamber of the mine to the place where the engineer stands; that in case one should fail, the other may take effect.

SAUCISSON, in fortification, a mass of large branches of trees bound together; and differing only from a fascine, as this is composed of small branches of twigs. See the article **FASCINES**.

Saucissons are employed to cover the men, and to make epaulements.

SAVE, a large river of Germany, which rising in Carinthia, runs east through Carniola and Croatia, and dividing Slavonia from Turkey, discharges itself into the Danube at Belgrade.

SAVIGLIANO, a town of Piedmont, twenty-one miles south of Turin.

SAVIN, *sabina*, in botany, is only a species of juniper. See the article **JUNIPER**.

Savin is famous as an hystric and attenuant: and, indeed, it promotes the discharges by urine, and the menses, more forcibly than safely, if not under very careful management.

SAVIOUR, an appellation peculiarly given to Jesus Christ, as being the true Messiah, and Saviour of the world. See the article **MESSIAH**.

Order of St. SAVIOUR, a religious order in the romish church, founded by St. Bridger, about the year 1345; and so called from its being pretended that our Saviour himself dictated to the foundress its constitutions and rules.

According to the constitutions, this order is principally founded for religious women who pay a particular honour to the holy virgin: but there are some monks of the order, to administer the sacraments, and spiritual assistance to the nuns. The number of nuns is fixed at sixty in each monastery; and that of the religious priests at thirteen, according to the number of the apostles, of whom St. Paul was the thirteenth. There are also four deacons, representing the four doctors of the church, St. Ambrose, St. Augustin, St. Gregory, and St. Jerom; and eight lay-brothers; who altogether

make up the number of the thirteen apostles, and the seventy-two disciples of Jesus Christ. The nuns are not admitted till eighteen years of age, nor the friars before twenty-five; and they are to perform a year's novitiate.

SAUMUR, a city of France, in the province of Orleans, and duchy of Anjou: twenty-four miles east of Anjou.

SAUNDERS, the same with **Santalum**. See the article **SANTALUM**.

SAVOLAXIA, a subdivision of Finland, in Russia, situated between Cajania, Kexholm, Carelia, and Bothnia.

SAVONA, a city and port-town of the territory of Genoa, situated twenty-six miles south-west of the city of Genoa.

SAVORY, *satureia*, in botany, &c. See the article **SATUREIA**.

SAVOUR, or **TASTE**. See **TASTE**.

SAVOY, a duchy, situated between France and Italy, on the west side of the Alps; bounded by the lake and territory of Geneva, on the north; by Switzerland and Piedmont, on the east; by another part of Piedmont and Dauphine, on the south; and by Franche Compté and Dauphine, on the west.

SAURURUS, in botany, a plant of the hexandria trigynia class, without any flower petals: its fruit is an oval unilocular berry, containing only a single oval seed.

SAUSAGE, or **SAUCIDGE**, a popular food, prepared of some crude meat, usually either pork or veal chopped small, seasoned, and put up in a skin or gut in the manner of a black-pudding.

The most esteemed confection of this kind is the bologna sausage, which is much thicker than the common sort, and is made of fresh pork well beaten in a mortar, with a quantity of garlic, pepper in the grain, and other spices. These sausages are made with most success in some cities of Italy, particularly in Bologna, Venice, &c. whence great quantities are exported to other places: the Italians are furnished with great part of their skins or guts for these sausages from England.

Bologna sausages, on being imported into England, pay a duty of $2\frac{87\frac{1}{2}}{100}$ d. the

pound; and draw back, on exportation, $2\frac{58\frac{3}{4}}{100}$ d.

SAUSAGE, in war, the same with saucisse. See the article **SAUCISSE**.

SAULT,

SAULT, in the manege. See **SALT**.

SAUVAGESIA, in botany, a genus of the polyandria-monogynia class of plants, the corolla whereof consists of five obtuse equal petals; shorter than the leaves of the cup: the fruit is an oval acuminate capsule, covered by the cup, containing one cell, and in it a number of seeds.

SAW, an instrument which serves to cut into pieces several solid matters; as wood, stone, ivory, &c.

The best saws are of tempered steel ground bright and smooth: those of iron are only hammer-hardened: hence, the first, besides their being stiffer, are likewise found smoother than the last. They are known to be well hammered by the stiff bending of the blade; and to be well and evenly ground, by their bending equally in a bow.

The edge in which are the teeth is always thicker than the back, because the back is to follow the edge. The teeth are cut and sharpened with a triangular file, the blade of the saw being first fixed in a whetting-block. After they have been filed the teeth are set, that is, turned out of the right line, that they may make the kerf or fissure the wider, that the back may follow the better. The teeth are always set ranker for coarse cheap stuff than for hard and fine, because the ranker the teeth are set the more stuff is lost in the kerf. The saws by which marble and other stones are cut have no teeth: these are generally very large, and are stretched out and held even by a frame.

The workmen who make the greatest use of the saw, are the sawyers, carpenters, joiners, cabinet-makers, ebonists, stone-cutters, carvers, sculptors, &c. The lapidaries too have their saw, as well as the workers in mosaic; but these bear little resemblance to the common saw. But of all mechanics, none have so many saws as the joiners; the chief are as follows: the pit saw, which is a large two handed saw, used to saw timber in pits; this is chiefly used by the sawyers. The whip-saw, which is also two handed, used in sawing such large pieces of stuff as the hand-saw will not easily reach. The hand saw, which is made for a single man's use, of which there are various kinds; as the bow or frame saw, which is furnished with cheeks: by the twisted cords which pass from the upper parts of these cheeks, and the tongue in the middle of them, the upper ends are drawn

closer together, and the lower set further apart. The tenon-saw, which being very thin, has a back to keep it from bending. The compass-saw, which is very small, and its teeth usually not set: its use is to cut a round, or any other compass-kerf: hence the edge is made broad and the back thin, that it may have a compass to turn in. See most of these saws represented in the plate of **JOINERY**.

The surgeons also use a saw to cut off bones; this should be very small and light, in order to be managed with the greater ease and freedom, the blade exceeding fine, and the teeth exquisitely sharpened, to make its way more gently, and yet with great expedition, in cutting off legs, arms, &c. See pl. CCXXXVI. fig. 7.

Saws, on being imported, pay the following duties, viz. whip-saws, each 11⁵/₁₀₀ d. draw back, on exportation,

10¹²/₁₀₀ d. Hand saws, the dozen, 1 s.

3⁴⁰/₁₀₀ d. draw back, on exportation, 1 s.

1¹/₂ d. Tenon-saws, the dozen, 2 s. 6⁸⁰/₁₀₀ d. draw back, on exportation, 2 s. 3 d. besides the usual duties on iron.

SAW-FISH, *Sereia piscis*, or *pristis*, in ichthyology, a species of *squalus*, with the rostrum very long, flat, and dentated on both sides. It is one of the most singular animals of the fish-kind, and grows to a considerable size, being often more than twelve feet in length, including the rostrum, and very thick in proportion: the head is large, and terminates in a bony rostrum, three or four feet, or more, in length, and furnished all along, on both sides, with very long, robust, and sharp teeth, or denticulations. See plate CCXXXVI. fig. 8.

SAWING, dividing timber, &c. by the application of a saw, either by the hand or mill.

The mechanism of a sawing-mill may be reduced to three principal things, the first, that the saw be drawn up and down as long as is necessary, by a motion communicated by water to the wheel: the second, that the piece of timber to be cut into boards be advanced by an uniform motion to receive the strokes of the saw; for here the wood is to meet the saw; and not the saw to follow the wood, therefore the motion of the wood and that of the saw ought immediately to depend the one on the other: the third, that

that when the saw has cut through the whole length of the piece, the whole machine stops of itself and remains immoveable; for fear, lest having no obstacle to surmount, the force of the water should turn the wheel with too great rapidity, and break some part of the machine. In plate CCXXXVII. and CCXXXVIII. we have given several views of this mill: plate CCXXXVII. fig. 1. represents a section of it taken lengthwise from A to B. Fig. 2. *ibid.* is a plan of the mill on a level with the ground: A B being the floor, and *ff, gg*, two grooves for receiving the shafts of the chariot, which carries the piece to be sawed; by which means the piece not only advances with the chariot, but is also kept steady, so that the strokes of the saw work always on the same line.

Fig. 1. pl. CCXXXVIII. represents the breadth of the mill: and fig. 2. *ibid.* the plan of the cave of the mill. In each of these figures the same letters express the same parts, only represented in a different view: thus M N, in fig. 1. and 2. *ibid.* represent the great wheel turned by a fall of the water, which has five feet and a quarter of radius, and its arbor is sixteen inches. O, in each of the figures, is the cog-wheel turning on the same arbor with the great wheel, and inserting its teeth into the spindles of the trundle-head P; and, on the other, into those of the trundle-head R: in the trundle-head P there is a broad handle fastened to the iron-blade Y, (pl. CCXXXVII. fig. 1. which, as the trundle-head moves round, goes up and down, and gives the same motion to the saw T: this handle is seen in its true form at Q, (plate CCXXXVIII. fig. 1. and 2.) The other trundle-head, R, which turns with its axle-tree, or roller, S, (*ibid.* fig. 2.) winds up a rope, which brings towards the saw, the chariot *x*, (plate CCXXXVII. fig. 1.) on which the piece of wood to be sawed is placed. When the wood is arrived close to the saw the rope is no longer of use; there being then another moderator which regulates the motion of the piece in proportion as it is sawed. Z, (pl. CCXXXVIII. fig. 1.) is a cramp-wheel, containing three hundred and eighty-four hooked teeth, the axis of which wheel drives two small trundle-heads, which are inserted into teeth which line the undermost part of the shafts of the chariot; by which means, if the cramp-wheel advances, the cha-

riot must also advance, and the piece of timber with it.

Upon the upper part of the entortise of the saw, (pl. CCXXXVII. fig. 1.) there is an iron-rod, *b*, fastened to it, on the one end with a hinge, and on the side to a moving lever, *d*, which goes up and down with it; this lever is fastened by a hinge at *a*: from the end of this lever there descends a wooden shaft, which carries at its extremity an iron in the form of a hind's foot, which enters the teeth of the cramp-wheel. In order to understand the use of all these parts, let it be observed, that after the rope, by being wound on the axis of the trundle-head R, has brought the chariot and piece of wood as far as the saw, the trundle-head P is let loose to the cog-wheel, which makes the handle Q, and consequently the saw, go up; which ascending lifts up the lever *d*, which drawing the hinge at *a* the handle protracts itself, and drives farther a notch of the cramp-wheel Z: this cramp-wheel, in turning with its axis, drives round the trundle-heads, which inserting their spindle into the teeth at the bottom of the chariot, carry off some of them, and make the piece of timber come a little forwards. This is all performed while the saw ascends: and as it is larger at the top than at the bottom, it leaves at that instant an empty space between itself and the piece of wood it has bit. The wood advances without any obstacle, and receives a new stroke in the fall of the saw, which works only in going down; the wheel Z is at that time without any motion, and therefore communicates none to the chariot. It is during that rest of the piece of wood that the stroke of the saw is given; and as the saw is broader at the top than at the bottom, it leans on the length of the wood, which is an ingenious imitation of the sawyers, who bring the saw down obliquely, because the fibres of wood are not easily cut when the stroke is transversal: and as the arms of the saw move backwards and forwards occasionally, to give the saw a proper inclination on the fibres of the wood; thus the upper iron rod, and the iron at the bottom of the saw obey the motion of the lever and handle, so as to form with the saw the inflexions necessary. This motion is continued, and the timber is still brought under the saw, till a band of iron fastened to the extremity of the piece of wood, meets with a trigger which draws out a

of a SAWING-MILL.

A Section & Plan

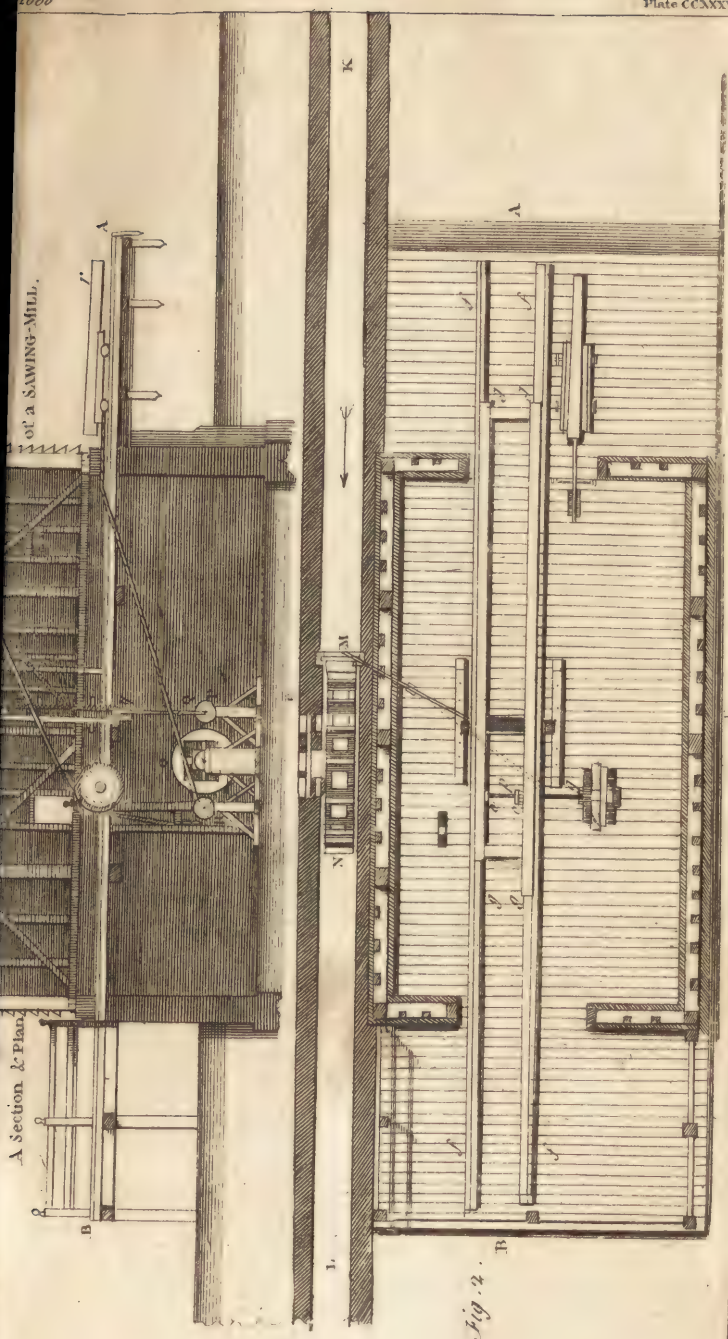


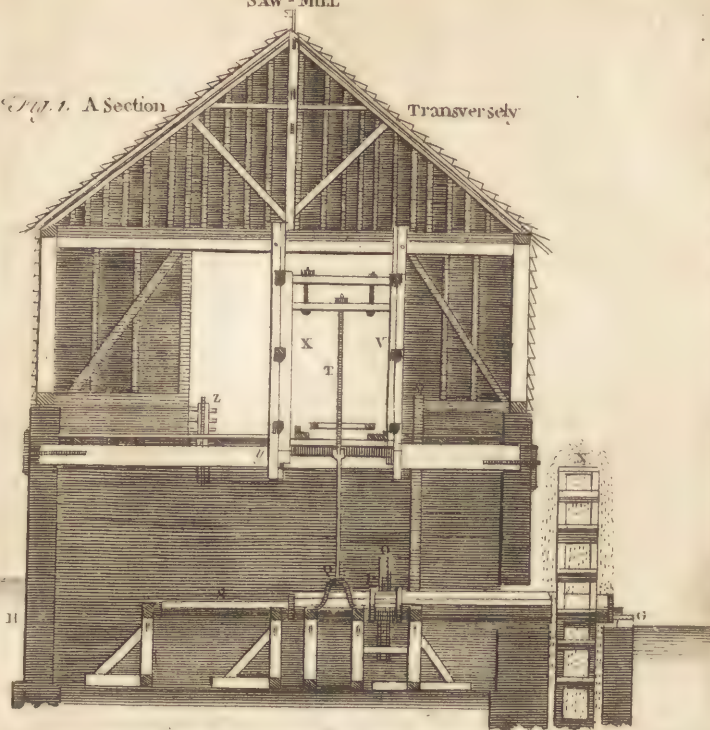
Fig. 2.



SAW - MILL

Fig. 1. A Section

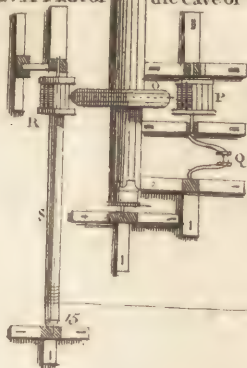
Transversely



G

L N M K

Fig. 2. A Plan of the Cave of the Mill



I

H



pin applied to the sluice to keep it up: when the sluice falls the water stops, and the whole machine is without motion. Sawing-mills are much used abroad, and were lately begun to be introduced in England; but the parliament taking it into consideration that they would spoil the sawyer's trade, and ruin great number of families, thought fit to suppress them.

Stones, &c. are also sawed by an engine, the principal parts of which are represented in plate CCXXXIX. fig. 1. n^o. 1. where ILLI, is a square frame perpendicular to the horizon, moving in the direction LL, in gutters made in the fixed beams AM, CB, and running upon little wheels. IL are two rods of iron, and *op* two hands of iron running along those rods; to these are fixed the saws S, S. HIK is a triangle fixed to the axis of a great wheel. As the wheel and triangle go about from H towards I, the point I acting against the piece G, moves the frame towards MB, together with the saws S, S. When I is gone off, the angle K acts against the piece F, and moves the frame back again. Then H, acting against G, moves it forward; and so the saws are moved backward and forwards, as long as the wheel turns round. As these saws work by the motion of the engine the hands *op* descend. The parts F and G ought to be made curved; and little wheels may be applied at the points of the triangle to take away the friction against F and G: and if the power be strong enough, the axle of the wheel may be made to carry more triangles, and work more saws. Instead of the triangle HIK, the frame may be moved by the two pieces, *ab*, *cd*, (*ibid.* n^o 2.) going thro' the axis across one another, so that *ab* may only act on F, and *cd* on G; F being only in the plane of *ab*'s motion, and G in that of *cd*.

SAXENHAGEN, a town of Westphalia, in Germany, twenty miles north-west of Hanover.

SAXIFRAGA, **SAXIFRAGE**, in botany, a genus of the decandria-digynia class of plants, with a roseaceous flower, consisting of five plane ovated petals: the fruit is an unilocular capsule, of an oval form, containing a great many seeds. See plate CCXXXVI. fig. 6.

The tuberosities at the root of the white-flowered saxifrage are kept in the shops, under the name of saxifrage-seeds: they

are diuretic and attenuant; and therefore good in nephritic cases and obstructions of the menles and viscera: some also recommend them in the jaundice and dropsy.

As to the saxifrage of the antients, it is not known what plant they meant by it; so that no benefit can be reaped from their accounts of its virtues.

It is also to be observed, that though many different plants have been called saxifrage, from their supposed power of dissolving the stone in the human bladder, yet it is very certain that none of them possess such a virtue: thus the filipendula has been called red-saxifrage, and the common melilot, yellow-saxifrage. See FILIPENDULA, &c.

SAXMUNDHAM, a market-town of Suffolk, thirty-two miles east of Bury.

SAXON, or **SAXON-LANGUAGE**. See the articles LANGUAGE and ENGLISH.

SAXONY, the name of two circles of the german empire; distinguished by the epithets upper and lower. The circle of Upper-Saxony comprehends the dutchy of Saxony, the marquises of Misnia, Lusatia, and Brandenburg, and the dutchies of Pomerania, Sax-Hall, Sax-Altemburg, Sax-Merzburg, and Sax-Naumburg. The circle of Lower-Saxony comprehends the dutchies of Mecklenburg, Holstein, Lawenburg, Lunenburg, Zell, Bremen, Brunswick, Hanover, and Magdeburg; the principalities of Verden and Halberstat, and the bishopric of Hildesheim.

SAY or **SAYE**, in commerce, a kind of serge, or woollen-stuff, much used abroad for linings, and by the religious for shirts: with us it is used for aprons by several sorts of artificers, being usually dyed green.

Double says, or serge, pay, on importation, a duty of 5 s. 3 $\frac{7}{8}$ d. the yard, and draw back, on exportation, 2 s. $\frac{3}{4}$ d. Double Flanders says pay, by the piece of fifteen yards, on importation, 1 l. 14 s. 7 $\frac{5}{8}$ d. and draw back, on exportation, 1 l. 10 s. 4 $\frac{5}{8}$ d. Hounscot says, and milled says, pay, by the piece of twenty-four yards, on importation, 1 l. 3 s. 1 $\frac{2}{3}$ d. and draw back, on exportation, 1 l. 3 d.

SAYBROOK, a port town of New-England, in the province of Connecticut, situated at the mouth of the river of Connecticut: in west longitude 72°, north latitude 41°.

SCAB, or **ITCH**, in medicine and surgery. See the article **ITCH**.

SCABBARD, in the manege, denotes the skin that serves as a sheath, or cover, to a horse's yard.

SCABELLUM, in antient architecture, a kind of pedestal to support busts. See the article **PEDESTAL**.

SCABIOSA, **SCABIOUS**, or **DEVIL'S BIT**, in botany, a plant of the tetrandriamogynia class, with a flosculous flower, each floscule being monopetalous and tubular, and slightly divided into four or five segments at the limb; there is no pericarpium; the seeds, which are single after each floscule, being crowned with their proper cups, and contained in the common receptacle.

The leaves of scabious stand recommended as aperient, sudorific, and expectorant; but the present practice has little dependance on these virtues.

SCAFFOLD, among builders, an assemblage of planks and boards, sustained by tressels and pieces of wood fixed in the wall; whereon masons, bricklayers, &c. stand to work in building high walls, &c. and plasterers, in plastering ceilings, &c.

Scaffold also denotes a timber-work raised in the manner of an amphitheatre, for the more commodious viewing any shew or ceremony: it is also used for a little stage, raised in some public place, whereon to behead criminals.

SCAGEN, or **SCAGERIFF**, a promontory of North-Jutland, at the entrance of the Scagerrac-sea, or passage out of the ocean into the Baltic-sea: east longitude 10° , north latitude 58° .

SCALA, in anatomy, a name given to two canals in the cochlea of the ear. See the article **EAR**.

SCALA, in architecture, the same with stair-case. See the article **STAIR-CASE**.

SCALA, in geography, a town of the kingdom of Naples, situated on the gulph of Salerno, twenty miles south of the city of Naples.

SCALÆ GEMONIÆ. See the article **GEMONIÆ SCALÆ**.

SCALADO, or **SCALADE**, in the art of war, a furious assault made on the wall or rampart of a city, or other fortified place, by means of ladders, without carrying on works in form to secure the men.

SCALE, a mathematical instrument, consisting of several lines drawn on wood, brass, silver, &c. and variously divided, according to the purposes it is intended

to serve; whence it acquires various denominations, as the plain scale, diagonal-scale, plotting scale, Gunter's scale, &c.

Construction and use of the plain SCALE.
The plain-scale is an instrument much used in navigation, &c. for solving the several cases of sailing. See the article **NAVIGATION**.

Having described the circle **DBCA**, (plate **CCXXXIX**. fig. 2. n^o 1.) and divided it into four quadrants, by the diameters **AB** and **CD** crossing each other at right angles: 1. To project the line of tangents, from the end **C** of the diameter **CD**, erect the perpendicular **CG**; then dividing the arch **CB** into nine equal parts, from the center **E**, through the several divisions of the quadrant **CB**, draw lines till they cut the perpendicular **CG**, which will thereby become a line of tangents.

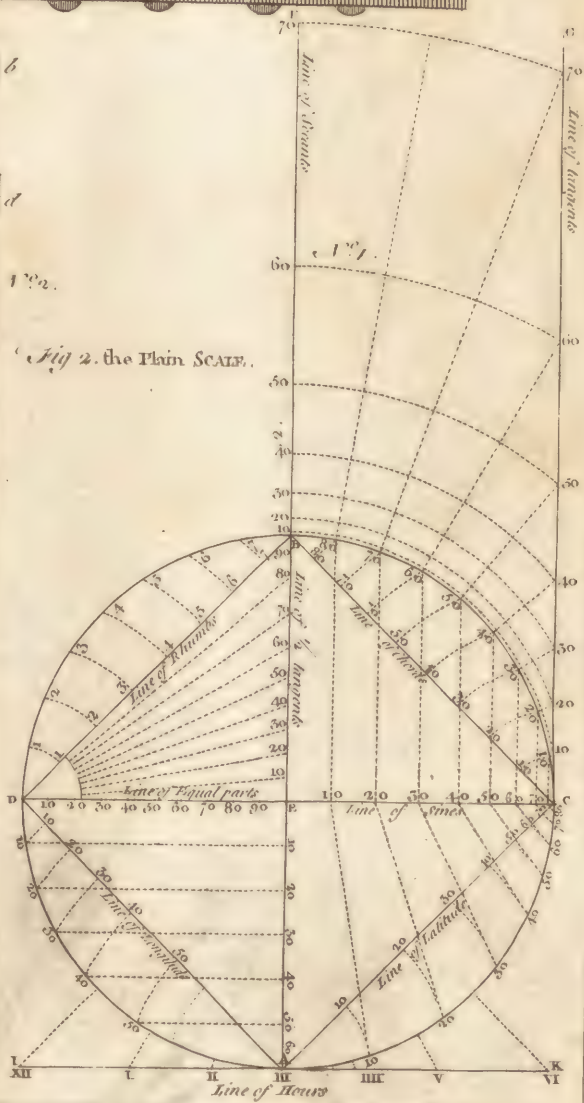
2. For the semi-tangents, or half tangents, let lines be drawn from the point **D**, through the same divisions upon the arch **CB**; and they will divide the radius **BE** into a line of semi-tangents, as is evident from Euclid. lib. 3. prop. 20.

3. For the secants, transfer the lines drawn from the center thro' the several divisions of the quadrant **CB** to form the line of tangents, to the line **EB** continued to **F**, and the line **EF** will be a line of secants.

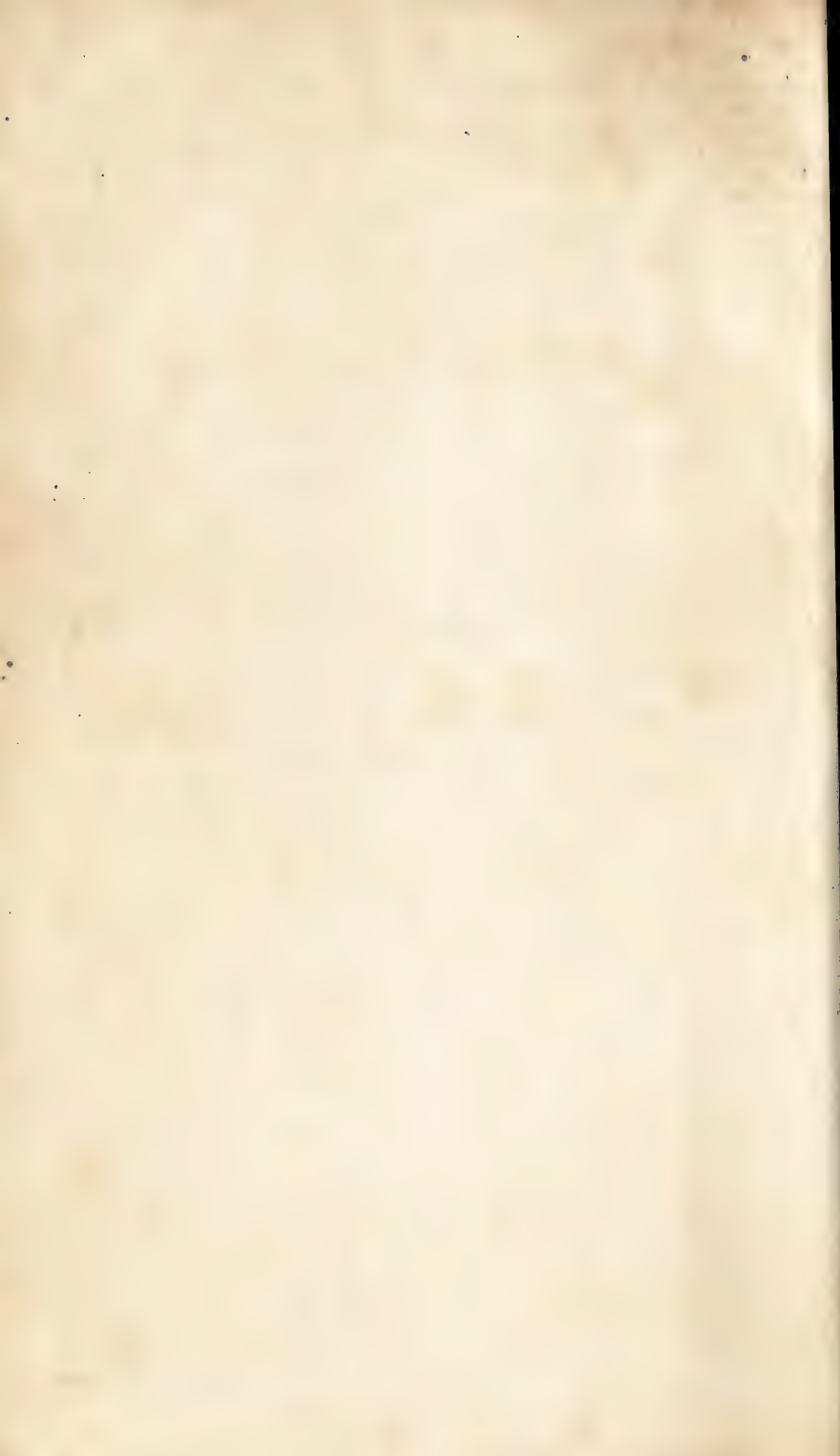
4. For the sines, from the several divisions of the quadrant **CB**, let fall perpendiculars upon the radius **CE**; which will thereby be divided into a line of sines, to be numbered from **E** to **C** for the right sines, and from **C** to **E** for the versed sines; and these versed sines may be continued to 180° , if the same divisions be transferred on the other side of the center **E**.

5. For the chords: the arch **CB** being divided into nine equal parts, in the points **10, 20, 30, &c.** if lines be imagined to be drawn from **C** to these divisions, they will be the chords of their respective arches: wherefore setting one foot of your compasses in the point **C**, and transferring the several lengths, **C10, C20, C30, &c.** to the line **CB**, it will thereby be divided into a line of chords. These several lines, which in the figure are drawn but to every tenth degree, might in the very same manner be constructed to every degree, if the circle were made large enough to admit of ninety distinct divisions in the arch of one of its quadrants.

6. A line of rhumbs is thus constructed: divide the arch **DB** into eight equal parts, in the points **1, 2, 3, 4, &c.** then setting



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setting one foot of the compasses in D, transfer the several distances D 1, D 2, D 3; from the arch to the line DB; which by this means will be divided into a line of rhumbs, each of which will answer to an angle of $11^{\circ} 15'$.

7. To construct a line of longitude, divide the radius EA into sixty equal parts, marking every ten with their proper numbers; from these divisions let fall perpendiculars upon the arch AD, and having drawn the line AD, with one foot of the compasses in A, transfer the several distances, where the perpendiculars cut the arch to the line AD, which will thereby be divided into a line of longitude.

8. To project the line of latitude, the radius CE being already divided into a line of lines, lay a ruler from the point B through each of the said divisions, and mark the points cut on the opposite arch AC with the numbers 10, 20, 30, &c. then having drawn the line AC, with one foot of your compasses in A, transfer the several intersections of the arch to the said line, which will thereby become a line of latitude.

9. To project the hour-line, draw the tangent IK equal and parallel to the diameter CD, and divide half the arch of each quadrant AC, and AD, from the point A, into three equal parts, which will be 15° each part, for the degrees of every hour from twelve to six; each of which parts are to be again subdivided into halves and quarters, &c. then drawing lines from the center E, through each of their divisions and subdivisions, till they cut the tangent IK, the said tangent will thereby be divided into a line of hours.

10. To the above lines may be added a line of inclination of meridians, which is projected in the same manner as the hour-line; being only divided into degrees, instead of time, every fifteen degrees being equal to an hour.

Now if these lines, with their respective divisions, be transferred to a scale, and there also be added a line of equal parts, the instrument called the plain-scale will be completed, as in *ib.* n^o 2. and as to the uses of these lines, those of tangents, semitangents, and secants, serve to find the centers and poles of projected circles, in the stereographic projection of the sphere, &c. the line of lines serves for the orthographic projection of the sphere; the line of chords serves either to lay down any angle, or measure the quantity of

one already laid down: the line of rhumbs serves with more readiness than the line of chords, to lay down or measure the angle of a ship's course in navigation: the line of longitude being laid down on the scale contiguous to a line of chords of the same radius, and numbered the contrary way, shews by inspection how many miles there are in a degree of longitude in each parallel of latitude; reckoning the latitude upon the line of chords, and the miles of longitude upon the line of longitude: the two lines of latitudes and hours are used conjointly, and serve very readily to mark the hour-lines in the construction of dials, on any kind of upright planes.

For the farther uses of the plain-scale, see the articles TRIGONOMETRY, NAVIGATION, PLOTTING, &c.

Diagonal-SCALE is projected thus: first draw eleven parallel lines at equal distances (see pl. CCXL. fig. 1.) the whole length of which being divided into a certain number of equal parts, according to the length of the scale, by perpendicular parallels, let the first division be again subdivided into ten equal parts, both above and below; then drawing the oblique lines from the first perpendicular below to the first subdivision above, and from the first subdivision below to the second subdivision above, &c. the first space shall thereby be exactly divided into one hundred equal parts; for as each of these subdivisions is one tenth part of the whole first space or division, so each parallel above it is one tenth of such subdivision, and consequently one hundredth part of the whole first space; and if there be ten of the larger divisions, one thousandth part of the whole scale. If therefore the larger divisions be accounted units, the first subdivisions will be tenth parts of an unit; and the second subdivisions, marked by the diagonals on the parallels, hundredth parts of an unit. Again, if the larger divisions be reckoned tens, the first subdivisions will be units, and the second subdivisions tenth parts: and if the larger divisions be accounted hundredths, the first subdivisions will be tens, and the second units; and so on.

Gunter's SCALE, an instrument, so called from Mr. Gunter its inventor, and is generally made of box: there are two sorts, the long Gunter and the sliding Gunter, having both the same lines, but differently used, the former with the

compasses, the latter by sliding. The lines now generally delineated on those instruments are the following, *viz.* a line of numbers, of sines, tangents, versed sines, sine of the rhumb, tangent of the rhumb, meridional parts, and equal parts; which are constructed after the following manner:

The line of numbers is no other than the logarithmic scale of proportionals, wherein the distance between each division is equal to the number of mean proportionals contained between the two terms, in such parts as the distance between 1 and 10 is 1000, &c. = the logarithm of that number. Hence it follows, that, if the number of equal parts expressed by the logarithm of any number be taken from the same scale of equal parts, and set off from 1 on the line of numbers, the division will represent the number answering to that logarithm. Thus, if you take .954, &c. (the logarithms of 9) of the same parts, and set it off from 1 towards 10, you will have the division standing against the number 9. In like manner, if you set off .903, &c. .845, &c. .778, &c. (the logarithms of 8, 7, 6) of the same equal parts from 1 towards 10, you will have the divisions answering to the numbers 8, 7, 6. After the same manner may the whole line be constructed.

The line of numbers being thus constructed, if the numbers answering to the natural sines and tangents of any arch, in such parts as the radius is 10000, &c. be found upon the line of numbers, right against them will stand the respective divisions answering to the respective arches, or which is the same thing, if the distance between the center and that division of the line of numbers, which expresses the number answering to the natural sine or tangent of any arch, be set off on its respective line from its center towards the left hand, it will give the point answering to the sine or tangent of that arch: thus the natural sine of 30 degrees being 5000, &c. if the distance between the center of the line of numbers (which in this case is = 10000, &c. = the radius) and the division, on the same line representing 5000, &c. be set off from the center, or 90 degrees, on the line of sines, towards the left hand, it will give the point answering to the sine of 30 degrees. And after the same manner may the whole line of sines, tan-

gents, and versed sines be divided. See the article GUNTER.

The line of sines, tangents, and versed sines being thus constructed, the line sine of the rhumb, and tangent of the rhumb are easily divided; for, if the degrees and minutes answering to the angle which every rhumb makes with the meridian, be transferred from its respective line to that which is to be divided, we shall have the several points required: thus if the distance between the radius or center, and sine of 45 degrees = the fourth rhumb, be set off upon the line sine of the rhumb, we shall have the point answering to the sine of the fourth rhumb; and after the same manner may both these lines be constructed. The line of meridional parts is constructed from the table of meridional parts, in the same manner as the line of numbers is from the logarithms.

The lines being thus constructed, all problems relating to arithmetic, trigonometry, and their depending sciences, may be solved by the extent of the compasses only; and, as all questions are reducible to proportions, the general rule is, to extend the compasses from the first term to the second, and the same extent of the compasses will reach from the third to the fourth; which fourth term must be so continued as to be the thing required, which a little practice will render easy.

SCALE, *scala*, in music, is a denomination given to the arrangement of the six syllables invented by Guido Areteine, *ut, re, mi, fa, sol, la*, called also gammut. See the article GAMMUT.

It bears the name scale (*q. d.* ladder) by reason it represents a kind of ladder, by means whereof, the voice rises to acute, or descends to grave; each of six syllables being, as it were, one step of the ladder. Scale is also used for a series of sounds rising or falling towards acuteness or gravity, from any given pitch of tune, to the greatest distance that is fit or practicable, through such intermediate degrees as make the succession most agreeable and perfect, and in which we have all the harmonical intervals most commodiously divided. See INTERVAL.

This scale is otherwise called an universal system, as including all the particular systems belonging to music. See SYSTEM. *Origin and construction of the SCALE of music.* Every concord or harmonical interval is resolveable into a certain number of

of degrees or parts; the octave, for instance, into three great tones, two less tones, and two semi-tones; the greater sixth into two greater tones, one less tone, and two semi-tones; the fifth into two greater tones, one less tone, and one semi-tone; the fourth into one greater tone, one less tone, and one semi-tone; the greater third into one greater tone, and one less tone; and the lesser third into one greater tone and one less tone. It is true, there are variety of other intervals or degrees, besides greater tones, less tones, and semi-tones, into which the concords may be divided; but these three are preferred to all the rest, and these three alone are in use. Farther, it is not any order or progression of these degrees that will produce melody; a number, for instance, of greater tones, will make no music, because no number of them is equal to any concord, and the same is true of the other degrees; there is a necessity, therefore, of mixing the degrees to make music, and the mixture must be such, as that no two of the same kind be ever next other. See the article CONCORD.

A natural and agreeable order of these degrees, Mr. Malcolm gives us in the following division of the interval of an octave, wherein (as all the lesser concords are contained in the greater) the divisions of all the other simple concords are contained. Under the series are the degrees between each term, and the next. In the first series, the progression is by the less third; in the latter, by the greater third.

Great 2d, gr. 3d, 4th, 5th, 6th, 7th, 8th.

1	2	3	4	5	6	7	8
Key of fund.	great tone.	great tone.	less tone.	less tone.	less tone.	less tone.	less tone.

Great 2d.

1	2	3	4	5	6	7	8
Key of fund.	great tone.	great tone.	less tone.	less tone.	less tone.	less tone.	less tone.

Now the system of the octave containing all the original concords, and the compound concords being only the sums of the octave and some less concord; it is evident that, if we would have the series of degrees continued beyond an octave, they are to be continued in the same order through a second as through the first octave; and so on through a third and a fourth octave, &c. and such a series is what we call the scale of music. See OCTAVE.

Of this there are two different species,

according as the less or greater third, or the less or greater sixth are taken in; for both can never stand together in relation to the same key or fundamental, to as to make an harmonical scale. But, if, by either of these ways, we ascend from a fundamental or given sound to an octave, the succession will be melodious, though the two make two different species of melody. Indeed, every note is discerned with regard to the next; but each of them is concord to the fundamental, except the second and seventh. In continuing the series there are two ways of compounding the names of the simple interval with the octave; thus a greater or lesser tone, or semi tone, above an octave or two octaves, &c. or to call them by the number of degrees from the fundamental, as ninth, tenth, &c. See the article SERIES.

In the two scales above, the several terms of the scale are expressed, by the proportionable sections of a line represented by 1, the key or fundamental of the series. If we would have the series expressed in whole numbers, they will stand as follows, in each whereof the greatest number expresses the longest chord, and the other numbers the rest in order; so that, if any number of chords be in these proportions of length, they will express the true degrees and intervals of the scale of music, as contained in an octave concinnously divided into the two different species above-mentioned.

540	480	432	405	360	324	288	270
great tone.	great tone.	less tone.	less tone.	less tone.	less tone.	less tone.	less tone.
216	192	180	162	144	135	120	108
great tone.	great tone.	less tone.	less tone.	less tone.	less tone.	less tone.	less tone.

This scale the antients called the diatonic scale, because proceeding by tones and semitones. See the article DIATONIC.

The moderns call it simply the scale, as being the only one now in use; and sometimes the natural scale, because its degrees and their order are the most agreeable and concinnous, and preferable, by the consent both of sense and reason, to all other directions ever instituted. Those others are the chromatic and enharmonic scales, which, with the diatonic, made the three scales or genera of melody of the antients. See the article CHROMATIC, &c.

The design of the scale of music is to shew how a voice may rise and fall less than any harmonical interval, and thereby move from

from one extreme of any interval to the other, in the most agreeable succession of sounds. The scale, therefore, is a system exhibiting the whole principles of music; which are either harmonical intervals (commonly called concords) or concinnous intervals. The first are the essential principles, the other subservient to them, to make the greater variety. See the article MUSIC.

Accordingly, in the scale we have all the concords with their concinnous degrees so placed, as to make the most perfect succession of sounds from any given fundamental or key, which is supposed to be represented by 1. It is not to be supposed that the voice is never to move up and down by any other more immediate distances than those of the concinnous degrees; for, though that be the most usual movement, yet, to move by harmonical distances, as concords, at once, is not excluded, but is even absolutely necessary. In effect, the degrees were only invented for variety's sake, and that we might not always move up and down by harmonic intervals, though those are the most perfect, the others deriving all their agreeableness from their subserviency to them. See CONCORD.

Add, that besides the harmonical and concinnous intervals, which are the immediate principles of music, and are directly applied in practice; there are other discord-relations which happen unavoidably in music in a kind of accidental and indirect manner; for, in the succession of the several notes of the scale, there are to be considered, not only the relations of those that succeed others immediately, but also of those betwixt which other notes intervene. Now the immediate succession may be conducted so as to produce good melody, and yet among the distant notes there may be very gross discords that would not be allowed in immediate succession, much less in consonance. Thus, in the first series or scale above delivered, though the progression be melodious, as the terms refer to one common fundamental, yet are there several discords among the mutual relations of the terms; *e. gr.* from 4th to 7th is 32 : 45, and from the greater 2d to the greater 6th is 27 : 40, and from the greater 2d to 4th is 27 : 32, which are all discords; and the same will happen in the second series. See the article DISCORD.

SCALE, in geography and architecture, a

line divided into equal parts, placed the bottom of a map, or plan, to serve as a common measure for all the parts of the building, or all the distances and places of the map.

SCALENE, or SCALENOUS TRIANGLE, *scalenum*, in geometry, a triangle whose sides and angles are unequal. See the article TRIANGLE.

SCALenus, in anatomy, a name given to one of the flexors of the neck. This muscle has its origin from the first, second and sometimes the third rib; and is inserted into the apophyses of the vertebrae of the neck, and is by some justly referred to the number of the elevators of the thorax. The scalenus is frequently divided into three parts, hence some anatomical writers have made three muscles of it, under the names of the first, the second, and the third scalenus.

SCALITS, a town of Upper Hungary situated on the confines of Moravia thirty-five miles north of Presburg.

SCALLOP, or the IRISH SCALLOP, in ichthyology, a name for the blue-ribbed red pecten variegated with white; being about two inches long, and nearly as much in breadth, having on the surface about fifteen broad depressed ribs placed at nearly equal distances from one another; the valves are very little elevated and the ears are moderately large, and one a little bigger than the other. See the article PECTEN.

SCALLOWAY, a town on the west side of Mainland, one of the islands of Shetland: west long. 1° 5', north lat. 61° 12'.

SCALPEL, in surgery, a kind of knife used in anatomical dissections and operations in surgery. See KNIFE.

SCALPER, or SCALPING-IRON, a surgeon's instrument used for scraping for carious bones.

SCALPRA *dentalia*, instruments used by the surgeons to take off those black, livid, or yellow crusts, which infect the teeth, and not only loosen and destroy them, but taint the breath. According to the varieties of the occasion, the surgeon has these instruments of various shapes and sizes; some are pointed, and narrow at the end; others are broader pointed, and have edges, others are hooked, or falciform, but these are usually, for convenience of carriage, all adapted to one handle. The manner of using them is to begin near the gums, supporting the blade with the left hand, and scraping all along the tooth, till the crust

crust is taken off, taking care not to wound the gums, or displace the teeth. **SCALPTOR ANI**, in anatomy. See the article **LATISSIMUS**.

SCAMILLI IMPARES, in the antient architecture, certain zoccos or blocks which serve to raise the rest of the members of an order, column, statue, or the like, and to prevent their being lost to the eye, which may chance to be placed below the level, or below the projecture of some of the ornaments.

SCAMMONY, in the materia medica, is a concreted vegetable juice of a plant of the same name, partly of the resin and partly of the gum-kind, of which there are two sorts, distinguished by the names of the places from whence they are brought.

The Aleppo scammony is of a spongy texture, light and friable: it is of a faint disagreeable smell, and its taste is bitterish, very nauseous, and acrimonious. The Smyrna scammony is considerably hard and heavy, of a black colour, and of a much stronger smell and taste than the former, otherwise it much resembles it.

In general, scammony is to be chosen friable and easily powdered, glossy when fresh broken; such as grows white on being moistened with the spittle; free from dirt, sand, or other foulnesses, and not too violently acrimonious in its taste. Scammony is in great esteem and frequent use, and would be more so, if it were more to be depended upon: but there is so much difference in the purgative virtue of some masses of it, and that of others, that it is seldom to be depended upon alone in extemporaneous practice. It is, however, an ingredient in many compositions of the shops; and these are prescribed, with other cathartics, for purging of ferous humours. It is in general, however, a better purge for robust people than for those of more delicate constitutions, though with the correctives with which it is joined, it is given with safety and success to children. The chemical writers have given us many preparations of scammony, among which are a tincture and a resin; but the scammony in substance is preferable to either; for they both irritate more, and yet purge less; the resin itself given in an equal dose with the crude scammony, will give fewer stools, and those attended with worse gripings. The antients used scammony externally

for cutaneous eruptions, and to soften hard tumours; but at present it is used only as a purge. For the preparation of scammony by baking it in a quince. See the article **DIAGRYDIUM**.

SCANDALUM MAGNATUM, in law, is a defamatory speech or writing to the injury of a person of dignity; for which a writ that bears the same name is granted for the recovery of damages. By statute, no person is either by writing or speaking to publish any false or scandalous news of any lord, prelate, officer of the government, judge, &c. on pain of imprisonment, till he produce his author; and if the same be published in a libel, the publisher is indictable, and may be fined and imprisoned. See **LIBEL**.

When an action of scandalum magnatum is brought, the same must be sued in the name of the king and the party, on which the plaintiff recovers his damages for the wrong, and the defendant is to be imprisoned on the king's account. It is here to be observed, that the words spoke shall be taken in the worst sense, to preserve the honour of great persons; though at the same time it is said, a defendant may justify in this action, setting forth the special matter.

SCANDEROON, a port-town of Aleppo, in asiatic Turkey, situated on the coast of the Lesser Asia: east long. 37°, north lat. 36° 15'.

SCANDINAVIA, a large country which consisted of Sweden, Denmark, and Norway, which were sometimes under the government of one prince; but is now under the dominion of Sweden and Denmark.

SCANDIX, or **SCANDYX**, in botany, a plant of the pentandria-digynia class, the compound flower of which is made up of hermaphrodite ones on the disc, and female ones in the radius: there is no pericarpium, the seeds, which are two in number and subulated, being joined together sidewise.

This genus comprehends the venus's comb or shepherd's needle, and chervil of authors.

SCANNING, *scansio*, in poetry, the measuring of a verse by feet, in order to see whether or no the quantities be duly observed.

The term is chiefly used in regard to the greek and latin verses. Thus an hexameter verse is scanned, by resolving it into six feet; a pentameter, by resolving it into five feet, &c. examples of which may

may be seen under the articles PENTAMETER, HEXAMETER, &c.

SCANSORIUM, in Roman antiquity, an engine whereby people were raised aloft, that they might see more conveniently about them. The scansorium amounted to the same with what was called the acrobatica among the Greeks. Authors are divided as to the office of this engine. Turnebus and Barbarus, take it to have been of the military kind, raised by besiegers, high enough to overlook the walls, and discover the state of things on the other side. Baldus rather supposes it a kind of moveable scaffold, or cradle contrived for raising painters, plaisterers, and other workmen, to the tops of houses, trees, &c. Some suspect that it might have been used for both purposes.

SCAPE GOAT, in Jewish antiquity, the goat which was set at liberty on the great day of expiation. See EXPIATION.

Spencer is of opinion, that the scape-goat was called azazel, because it was sent to azazel, *i. e.* the devil; the reasons of which ceremony, he takes to be these. 1. That the goat, loaded with the sins of the people, and sent to azazel, might denote the miserable condition of sinners. 2. The goat was sent thus loaded to the dæmons, to shew that they were impure, and to deter the people from worshipping them. 3. That the goat sent to azazel sufficiently expiating the sins of the Israelites; they might the more willingly abstain from the expiatory sacrifices of the heathens.

SCAPHISM, *σκαφισμος*, in Persian antiquity, a kind of torture, or capital punishment; which consisted in locking the criminal in a sort of box made of the trunk of a tree, with only five holes for his head, arms and legs to come through; then anointing the parts with honey and milk, in order to invite the flies, &c. he was exposed to the sun; and, in this unhappy situation, he continued till death put an end to his misery.

SCAPHOIDES, in anatomy, the same with navicular os. See the article NAVICULARE OS.

SCAPULA, in anatomy, the shoulder-blade, a triangular bone, situated on the outside of the ribs, and commonly extended from the second to the seventh rib; its superior posterior angle, when it is in the least straining position, being about three inches from the spinal processes of the vertebræ, while the long side between that angle and the inferior one

is stretched obliquely forward as it descends, having nothing between it and the ribs, except the thin extremities of some muscles; but as the scapula advances forwards to its articulation with the arm bone, its distance from the ribs increases.

In the examination of the scapula, says Heister, we are to observe the head of the bone, with its glenoid cavity, called by some the acetabulum of the scapula; its neck; its base; its two angles, the superior and inferior; its superior and inferior costæ; its anterior surface, which is smooth and concave; and its posterior which is uneven. After these we are to observe its spine, its crest, and its acromion; its supra and infra spinate cavity; its coracoid process, and its two incisures, the one between the neck and the acromion, the other behind the coracoid process; and the robust ligament which joins the acromion and coracoid process, and prevents the laxation of the os humeri upwards.

The uses of the scapula are to sustain the arms, and join them to the body, serve for the insertion of several muscles, and to add somewhat to the necessary defence of the parts contained within the thorax.

Fracture of the SCAPULA. The scapula is usually fractured either near its acromion, or head where it joins the clavicle, or in some more distant part. If the fracture happens in the process of the acromion, the reduction will be easily made, by lifting up the arm to relax the deltoid-muscle, and pushing the arm evenly upwards, making the fractured parts meet together with the fingers: but notwithstanding their reduction is so easy, they easily slip away again from a slight cause, and so are difficultly agglutinated. They are in particular very easily separated by the weight and motion of the arm, and by the contraction of the deltoid-muscle, inasmuch that there is scarce ever an instance of a fracture of the acromion being so perfectly cured, as to admit afterwards of a free motion of the arm upwards: all means must, however, be used to endeavour to keep the replaced bones in their proper situation. A compress, wet with spirit of wine, is to be applied to the fracture, a ball is to be put under the arm-pit to support the whole is to be bound up with a bandage commonly called spica, and the arm is to be suspended in a sash or sling.

hung about the neck. But if the neck of the scapula, which lies under the acromion, or its acetabulum, should be fractured, which is a case that indeed very seldom happens, and when it does is very difficult to discover, it is a hundred to one but from the vicinity of the articulation, the tendons, muscles, ligaments, nerves, and large veins and arteries, there will follow a stiffness and loss of motion in the joint; great inflammation is also to be apprehended, and abscesses with the worst symptoms, and sometimes death itself.

SCAPULAR, *scapulares*, in anatomy, a name given to two pair of arteries, and as many veins; the arteries are the external scapular artery, which is sent from the subclavians to the external parts of the scapula; and the internal scapular artery, which arises from the axillary arteries, and goes to the parts that lie under the scapula. The scapular veins, which are also external and internal, arise in like manner from the subclavians. See **ARTERY** and **VEIN**.

SCAPULAR, or **SCAPULARY**, a part of the habit of several religious orders in the church of Rome, worn over the gown, as a badge of peculiar veneration for the blessed Virgin. It consists of two narrow breadths or slips of cloth, covering the back and the breast, and hanging down to the feet.

The devotees of the scapulary celebrate its festival on the 16th of July. The bulls of the popes have from time to time secured indulgences without number to them: but what sets the scapulary above all other practices of devotion, is the sabbatin bull of pope John XXII. in which that pope declares, that the blessed Virgin, one day as he was at prayers, gave him a positive promise, that she would deliver the carmelites her children, and the brethren of the scapulary, out of purgatory, on the Sunday after their death, upon three conditions; 1. to wear their scapulary till their death: 2. to preserve their virginity; and, 3. to abstain from flesh every Wednesday and Friday in the year. See the articles **FRA-TERNITIES** and **CARMELITES**.

SCAPUS, in architecture, the fust or shaft of a column. See the article **FUST**.

In botany, the same word is used for the strait stalk or stem of a plant, standing upright like a pillar or column.

SCAR, or **ESCHAR**, the seam or mark of a wound after it is healed. See **WOUND**.

SCARA, a town of Sweden in the province of west Gothland, sixty-six miles north-east of Gottenburg.

SCARABÆUS, the **BEE-TLE**, in zoology, a numerous genus of insects, of the coleoptera-order: the antennæ of the beetles are of a clavated figure, and fissile longitudinally; and their eggs all hatch into hexapode worms, from which the young beetles are afterwards produced. See the article **COLEOPTERA**.

We have already described the cervus volans or stag-beetle; besides which there are numerous other species, the description of which may be seen in Ray's History of Insects, Linnæus's Syst. Nat. and Hill's Nat. Hist.

SCARBOROUGH, a borough and port-town of Yorkshire, thirty-seven miles north-east of York.

It sends two members to parliament, and is famous for a medicinal spring, which has been the subject of great contests and disputes among the physical people; all allowing it considerable virtues, but some attributing them to one ingredient, others to another.

SCARDONNA, a port-town of Dalmatia, situated on a bay of the gulph of Venice, forty-five miles north of Spalatto.

SCARE-CROW GULL, in ornithology, a name for the black larus with grey wings and red legs, being of the size of the common pigeon. See **LARUS**.

SCARIFICATION, in surgery, the operation of making several incisions in the skin by means of lancets, or other instruments, particularly the cupping-instrument. See the article **CUPPING**.

With regard to the usefulness of scarification, Heister observes, that as much and as thick blood may be discharged this way as by phlebotomy, and that of consequence it must be equally beneficial in all disorders which require bleeding. Besides, scarification is highly necessary in violent inflammations, incipient or confirmed mortifications, pestilential carbuncles, and the like, in order to discharge the stagnant and vitiated blood, by making many small wounds or incisions with a scalpel or lancet. Heister also thinks scarification of the gums, in the tooth-ach, may not unfrequently be very useful; as of the eyes in many disorders, if performed with caution.

The instruments used by different operators for scarifying the eyes, are different: some of the antients used a steel-rasp in

form of a spoon, see letter A plate CCXL. fig. 2. others used a prickly thistle, like the *atrastylis*; or, the *equisetum majus*. But the latest and best instrument for this operation, is the beards of barley or rye, furnished with rows of small hooks, represented, *ibid.* at letter B. Ten, twelve, or fifteen of these beards may be tied together, so as to form a kind of brush, as at C; with which the inside of the eye-lids, and even the eye itself, may be scarified. However, such a brush cannot be used more than once, as a very small force blunts it; it is also to be observed, that the beards of old or ripe barley is not so proper as those of barley not quite ripe. Heister thinks this operation may be of considerable service in all inflammatory disorders of the eyes; but at the same time thinks blisters, phlebotomy, and scarifications in other parts might do as well, and be attended with much less pain.

To perform this operation, the patient is to be seated in a good light, and his head held still by an assistant, while the surgeon presses his thumb and fore-finger on the eyelids, so as to open them, and turn them outward, that their interior red surface may come into view; this is much more conveniently performed on the under than on the upper eyelid. When the surface is thus turned up, the surgeon draws the scarifying instrument backward and forward over it with great swiftness, as also over the white of the eye, if there be occasion; and, by this means, opens all the turgid vessels, and makes them bleed plentifully, fomenting the eye with a sponge dipped in warm water.

When the operation is over, great care is to be taken, that the wounded parts do not cohere together; the patient must move the eyelids about at times to prevent this, and the eye, when bound up at night, must have a piece of gold-beater's skin applied between the eyelids and the eye.

SCARLET, a beautiful bright red. See the articles **RED** and **COLOUR**.

In painting in water-colours, minium mixed with a little vermilion produces a good scarlet; but if a flower in a print is to be painted of a scarlet-colour, the lights as well as the shades should be covered with minium, and the shaded parts finished with carmine, which will produce an admirable scarlet.

To dye cloth, stuff, &c. a scarlet, let the stuffs be alumed, as for crimson, in river-water, boil them for two hours, then hang them out a whole night without rinsing; but in the morning rinse them out. Then in order to dye them, take clean bran-water clean skimmed, and for every pound of goods put in an ounce of pulverized tartar; having first mixed one half of it with half an ounce of cochineal, and when the liquor where the remaining half of the tartar is has boiled, then put in the cochineal, &c. Boil them together, afterwards add half an ounce of aqua fortis, in which a small quantity of sal armoniac (not bigger than a pea) has been dissolved; which must be put in when the stuffs have boiled about a quarter of an hour; then boil them together for a little while, let the liquor cool, and rinse out the stuffs.

To dye a scarlet in grain, take stale clear wheat-bran liquor, a sufficient quantity; alum, three pounds; enter twenty yards of broad-cloth, and boil it three hours; cool and wash it; take fair water, a sufficient quantity; hedder or strawel, a fit quantity; boil them well; cool them with a little water, enter your cloth and make a bright yellow; cool and wash it again; take fresh wheat-bran-liquor, a sufficient quantity; madder, four pounds; enter your cloth at a good heat; handle it to a boiling, cool and wash it well: take more fresh bran liquor; cochineal in fine powder, five ounces; and tartar, three ounces; enter your cloth, and boil an hour or more, keeping it under the liquor, then cool and wash it.

SCARLET-FEVER, the same with miliary fever. See **MILIARY FEVER**.

SCAROS, or **SAROS**, a town of Upper Hungary, near the Carpathian mountains: east long. $20^{\circ} 40'$, north latitude $48^{\circ} 45'$.

SCARP, in fortification, is the interior talus, or slope of the ditch next the place, at the foot of the rampart.

SCARP, in heraldry, the scarf which military commanders wear for ornament.

It is borne somewhat like a battoon sinister, but is broader than it, and is continued out to the edges of the field: whereas the battoon is cut off at each end. See plate CCXL. fig. 3.

SCARPANTO, an island in the Mediterranean, twenty miles south-west of Rhodes: east long. 27° , north lat. 36° .

SCARPE, a river of the Netherlands, which

which rises in the province of Artois, and falls into the river Scheld, a little below Mortaigne.

SCARUS, in ichthyology, a species of the labrus, variegated with purple, green, blue and black. See **LABRUS**.

SCATCH-MOUTH, in the manege, a bit-mouth, differing from a cannon-mouth in this, that the cannon is round, whereas a scatch is more upon the oval. That part of the scatch-mouth that joins the branch by a fonceau, and a scatch by a chaperon, which surrounds the banquet. The effect of the scatch-mouth is somewhat greater than that of the cannon-mouth, and keeps the mouth more in subjection. Commonly snaffles are scatch-mouths.

SCAVAGE, a toll or custom antiently exacted by mayors, sheriffs and bailiffs of cities and towns-corporate, and of merchant-strangers, for wares exposed and offered to sale within their liberties; which was prohibited by 19 Hen. VII. But the city of London still retains this custom.

SCAVANT, a term purely french, signifying learned; it is little used in our language, except in the phrase *Journal des Scavans*, a journal of the works of the learned, published monthly at Paris.

SCAVENGERS, two officers annually chosen in every parish in London and its suburbs by the church-wardens, constables, and other inhabitants, to hire persons called rakers, with carts, to clean the streets, and carry away the dirt and filth, with the ashes and dust from every house. For which purpose a scavenger's tax may be made and levied on the inhabitants, being allowed by the justices of the peace; but it must not exceed 4 d. in the pound, of the rent paid for the houses. Persons who refuse to take upon themselves the office of scavenger, forfeit 10 l. 2 W. and M. c. 2. 1 Geo. I. c. 48. 10 Geo. II. c. 22.

SCELASIUS, in natural history, an animalcule which has visible limbs, arranged, according to Dr. Hill, in the class of the arthronia. See **ANIMALCULE**.

There are two species of the scelasius, that with the body of a suboval figure of the shape of an egg, its skin perfectly smooth, very thin, and of a pale olive-colour, and so transparent, that the lineament of the intestines are seen easily through it.

SCENE, *scena*, in its primary sense, denot-

ed a theatre, or the place where dramatic pieces, and other public shews were exhibited: for it does not appear that the antient poets were at all acquainted with the modern way of changing the scenes in the different parts of the play, in order to raise the idea of the persons represented by the actors being in different places.

The original scene for acting of plays was as simple as the representations themselves; it consisted only of a plain plot of ground proper for the occasion, which was in some degree shaded by the neighbouring trees, whose branches were made to meet together, and their vacancies supplied with boards, sticks, and the like; and to complete the shelter, these were sometimes covered with skins, and sometimes with only the branches of other trees newly cut down, and full of leaves. Afterwards more artificial scenes or scenical representations were introduced, and paintings used instead of the objects themselves. Scenes were then of three sorts, tragic, comic, and satyric. The tragic scene represented stately magnificent edifices, with decorations of pillars, statues, and other things suitable to the palaces of kings: the comic exhibited private houses with balconies and windows, in imitation of common buildings: and the satyric was the representation of groves, mountains, dens, and other appearances; and these decorations either turned on pivots, or slid along grooves, as those in our theatres.

To keep close to nature and probability, the scene should never be shifted from place to place in the course of the play: the antients were pretty severe in this respect, particularly Terence, in some of whose plays the scene never shifts at all, but the whole is transacted at the door of some old man's house, whither, with inimitable art, he occasionally brings the actors. The French are pretty strict with respect to this rule; but the English pay very little regard to it.

Scene is also a part or division of a dramatic poem. Thus plays are divided into acts, and acts are again subdivided into scenes; in which sense the scene is properly the persons present at, or concerned in the action on the stage at such a time: whenever, therefore, a new actor appears, or an old one disappears, the action is changed into other hands; and therefore a new scene then commences.

It is one of the laws of the stage, that

the scenes be well connected; that is, that one succeed another, in such a manner as that the stage be never quite empty till the end of the act. See the articles ACT, DRAMA, &c.

SCENIC GAMES, among the antients, were entertainments exhibited on the scena or theatre, including plays, dancing, and other theatrical performances.

The Romans were four hundred years without any scenic games, and at their institution some actors were sent for from Hetruria; who, without reciting any thing, danced to the sound of instruments; at length they began to rehearse verse, from thence they proceeded to plays, and thus by degrees, growing more and more perfect, their scenical shews were at last represented, with a justness and magnificence beyond every thing the world had ever seen.

SCENOGRAPHY, in perspective, the representation of a body on a perspective plane; or, a description thereof in all its dimensions, such as it appears to the eye. See the article PERSPECTIVE.

The ichnography of a building, &c. represents its plan, or ground-work; the orthography, is a view of the front, or one of its sides; and the scenography, is a view of the whole building, front, sides, height, and all, raised on the geometrical plan. See the articles ICHNOGRAPHY, and ORTHOGRAPHY.

To exhibit the scenography of any body, 1. Lay down the basis, ground-plot, or of the body, according to the method taught under the article PERSPECTIVE. 2. Upon the several points of the plan, raise the perspective heights; thus will the scenography of the body be completed, excepting that a proper shade is to be added.

The method of raising the heights is as follows: on any point, as C (plate CCXLI. fig. 1.) to raise a perspective altitude, answerable to an objective altitude PQ; on the terrestrial line raise a perpendicular PQ, equal to the given objective altitude; from P and Q, to any point, as T, draw right lines PT and QT; from the given point C, draw a right line CK, parallel to the terrestrial line DE, and meeting the right line QT in K; and in the point K, upon the line KC, erect a perpendicular IK, which will be the scenographic altitude required.

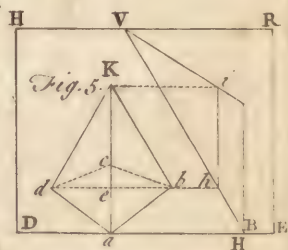
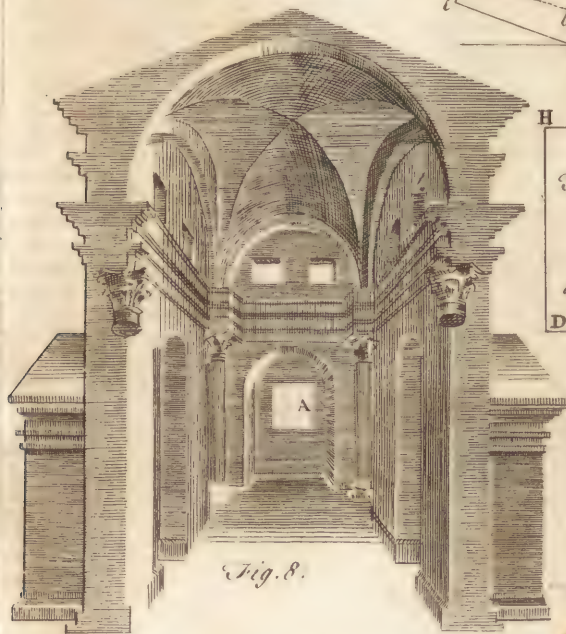
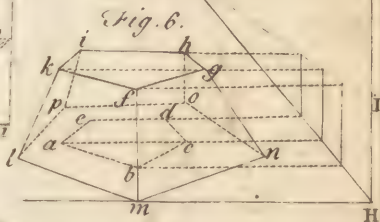
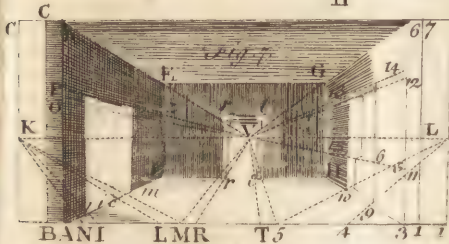
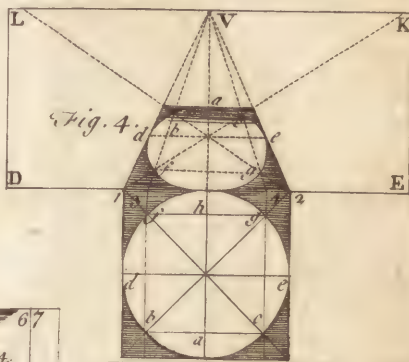
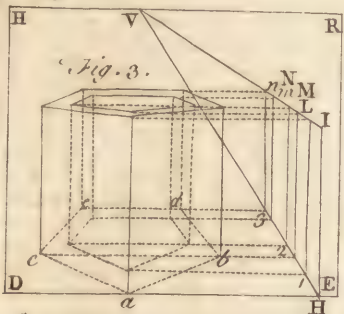
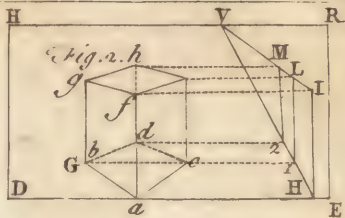
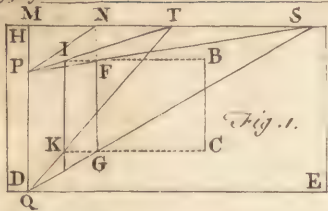
The application of this general method

of drawing the scenography of a body, is not so obvious, in every case, but that it may be necessary to illustrate it by a few examples.

Example I. To exhibit the scenography of a cube, viewed by an angle: 1. As the basis of a cube viewed by an angle, standing on a geometrical plane is a square, viewed by an angle; draw a square, viewed angular-wise, on the perspective table, or plane. 2. Raise the side HI (fig. 2.) of the square perpendicularly on each point of the terrestrial line DE; and to any point, as V, of the horizontal line HR, draw the right line VI and VH. 3. From the angles *d*, *b*, and *c*, draw *c* 1, *d* 2, &c. parallel to the terrestrial line DE. 4. From the points 1 and 2, raise L 1 and M 2 perpendicular to the same. Lastly, since HI is the height to be raised in *a*, LI in *c* and *b*, and M 2 in *d*; in *a* raise the line *fa* perpendicular to *aE*; in *b* and *c*, raise *bg* and *ce* perpendicular to *bc* 1; and lastly, raise *db* perpendicular to *d* 2, and make *af* = HI, *bg* = *ec* = L 1, and *bd* = M 2; if then the points *g*, *b*, *e*, *f*, be connected by right lines, the scenography will be complete.

Ex. II. To exhibit the scenography of a hollow quinquangular prism. 1. Since the base of a hollow quinquangular prism, standing on a geometrical plane, is a pentagon, with a limb or breadth of a certain dimension, find the appearance of this pentagon on a table, or plane. 2. On any point, as H, of the terrestrial line DE (fig. 3.) raise a perpendicular HI, equal to the objective altitude, and to any point, as V, of the horizontal line HR, draw the lines HV and IV. 3. From the several angles *a*, *b*, *d*, *e*, *c*, of the perspective ichnography, both the internal and external ones, draw right lines, as *b* 2, *d* 3, &c. parallel to the terrestrial line; and from the points 1, 2, 3, raise perpendiculars to the same, as L 1, M 2, *m* 2, N 3, *n* 3. If these then be raised in the correspondent points of the ichnography, as in the preceding article, the scenography will be complete.

Ex. III. To exhibit the scenography of a cylinder. 1. Since the base of a cylinder, standing on a geometrical plane, is a circle, seek the appearance of a circle; in the points *a*, *b*, *d*, *f*, *b*, *g*, *e*, *c*, (fig. 4.) raise the apparent altitudes, as in the preceding articles. If now their upper lines





be connected by curve lines, in the base a, b, d, f, c, b, e, c , the scenography of their circle will be compleat.

It is evident that those lines are to be omitted, both in the plan and in the elevation, which are not exposed to the eye; though they are not to be disregarded from the beginning, as being necessary for the finding of other lines; *e. gr.* in the scenography of the cube, viewed angle-wise, the lines bd and dx (fig. 21) in the base, and the line db in the elevation, are hid from the eye, and are therefore omitted in the description. But, since the point H is not to be found, unless the point d be had in the ichnography, nor the lines gb and de be drawn without the height db , the appearance of the point d is as necessary to be determined in the operation, as the height bd .

Ex. IV. To exhibit the scenography of a pyramid standing on its base. Suppose, *e. gr.* it were required to delineate a quadrangular pyramid, viewed by an angle: 1. Since the base of such pyramid is a square seen by an angle, draw such a square. 2. To find the vertex of the pyramid, *i. e.* a perpendicular let fall from the vertex to the base, draw diagonals mutually intersecting each other in e (fig. 5.) 3. On any point, as H , of the terrestrial line DE , raise the altitude of the pyramid HI ; and, drawing the right lines HV and IV to each point of the horizontal line HR , produce the diagonal rb , until it meet the line VH in b . Lastly, from b draw bi parallel to HI . This, being raised on the point e , will give the vertex of the pyramid K ; consequently the lines dK , Ka , and Kb will be determined at the same time. After the like manner is the scenography of a cone delineated.

Ex. V. To exhibit the scenography of a truncated pyramid. Suppose the truncated pyramid quadrangular: first then, if from the several angles of the upper base be conceived perpendiculars, let fall to the lower base, we shall have a pentagon, with another inscribed therein, whose sides are parallel to those of the former: this coincides with a pentagon, furnished with a rim or breadth, &c. and may therefore be delineated in the same manner. 2. Raising the altitude of the truncated pyramid IH (fig. 6.) determine the scenographic altitudes to be raised in the points a, b, c, d . If now the points f, g, b, i, k , be connected by right lines, and the lines lk, fm, gn, ho , be

drawn, the scenography will be compleat. By drawing two concentric circles in a geometrical plan, and doing every thing else, as in this problem, the scenography of a truncated pyramid will be drawn.

Ex. VI. To exhibit the scenography of walls, columns, &c. or to raise them on a pavement. 1. Suppose a pavement AF, HI (fig. 7. 8.) represented in a plan, together with the bases of the columns, &c. if there be any. 2. Upon the terrestrial line set off the thickness of the wall BA and $1, 3$. 3. Upon A and B , as also upon 3 and 1 , raise perpendiculars AD and BC , as also $3, 6$, and $1, 7$. 4. Connect the points D and 6 with the principal point V , by the right lines DV and $6V$. 5. Upon I and H raise perpendiculars HG and EF . Thus will all the walls be delineated. Now to raise the pillars, &c. there needs nothing but from their several bases (whether square or circular) projected on the perspective plan, to raise the indefinite perpendiculars; and on the fundamental line, where intersected by the radius Fa passing through the base, raise the true altitude AD ; for DV , being drawn as before, the scenographical altitudes will be determined.

Ex. VII. To exhibit the scenography of a door in a building. Suppose a door required to be delineated in a wall $DEFA$ (fig. 7.) 1. Upon the fundamental line set off its distance AN from the angle A , together with the breadths of the posts NI and LM , and the breadth of the gate itself LI . 2. To the point of distance K , from the several points N, I, L, M , draw right lines KN, KI, KL, KM , which will determine the breadth of the door li , and the breadths of the posts cn and ml . 3. From A to O set off the height of the gate AO , and from A to P , the height of the posts AP . 4. Join O and P with the principal point by right lines PV and OV . 5. Then, from n, i, l, m , raise perpendiculars, the middle ones whereof are cut by the right line OV in o , and extremes, by the right line VP in p . Thus will the door be delineated, with its posts; if the door were to have been exhibited in the wall $EFGH$, the method would be nearly the same: For, 1. Upon the terrestrial line, set off the distance of the door from the angle, and thence also the breadth of the door RT . 2. From R and T , draw right lines to the principal point V ,
to

to have the breadth rt in the perspective plan. 3. From r and t raise indefinite perpendiculars to FH . 4. From A to O set off the true height AO . Lastly, from O to the principal point V , draw the right line OV , intersecting EF in Z , and make rr and tt equal to TZ . Thus is the door rr , tt , drawn, and the posts are easily added, as before.

Ex. VIII. To exhibit the scenography of windows in a wall. When you know how to represent doors, you will find no difficulty in adding windows; all that is here further required, being to set off the height of the window from the bottom of the ground. The whole operation is as follows: 1. From 1 to 2, set off the thickness of the wall at the window; from 3 to 4, its distance from the angle 3; and from 4 to 5, its breadth. 2. From 4 and 5, to the point of distance L , draw the right lines $E5$ and $L4$, which will give the perspective breadth 10, 9 of the window. 3. From 10 and 9, raise perpendiculars to the pavement, that is, draw indefinite parallels to 6, 3. 4. From 3 to 11, set off the distance of the window from the pavement 3, 11, and from 11 to 12, its height 11, 12. Lastly, from 11 and 12, to the principal point V , draw the lines $V11$ and $V12$, which intersecting the perpendiculars 10, 13, and 9, 14, in the points 13 and 14, as also in 15 and 16, will exhibit the appearance of the window.

From these examples which are only applications of the first grand rule, it will be easily perceived what method to take to delineate any other object, and at any height from the pavement.

SCENOPEGIA, in jewish antiquity, the same with the feast of tabernacles. See the article **TABERNACLE**.

SCEPTER, a kind of royal staff, or battoon, borne by kings, on solemn occasions, as an ensign of command and authority. See the article **REGALIA**.

The scepter is of greater antiquity than the crown. The greek tragic poets, put scepters into the hands of the most ancient kings they ever introduce. Among the Romans, the scepter was first assumed by Tarquin the elder. We are informed by Le Gendie, that the scepter borne by the first race of the french kings was a golden rod, crooked at one end like a crozier, and almost always of the same height as the king himself.

SCEPTER, in astronomy, one of the six new

constellations of the southern hemisphere consisting of seventeen stars.

SCEPTICISM, the doctrines and opinions of the sceptics, whose distinguishing tenet was, that all things are uncertain and incomprehensible, and that the mind never to assent to any thing, but to remain in perpetual doubt and suspense. This doctrine was also called pyrrhonism from the name of its author. See the article **PYRRHONIANS**.

SCHAFFHOUSE, the capital of the canton of Scaffhouse, one of the most northern cantons of Switzerland: east long. $8^{\circ} 40'$, north lat. $47^{\circ} 42'$.

SCHALHOLT, the capital of Iceland subject to Denmark: west long. 19 north lat. $64^{\circ} 30'$.

SCHAMACHIA, a city of Persia, in the province of Chirvan, situated on the west side of the Caspian Sea, in east long. 56° north lat. 41° .

SHEAT, or **SEAT**, a fixed star of the second magnitude, in the juncture of the leg with the left shoulder or pegasus. See the article **PEGASUS**.

SCHELD, a river which rises in the confines of Picardy, and runs north-east by Cambray, Valenciennes, Tournay, Oudenarde, &c. and receiving the Lys at Ghent, runs east by Dendermond, and then north to Antwerp, below which city it divides into two branches, one called the Wester-Scheld, which separates Flanders from Zealand, and discharges itself into the sea near Flushing; and the other called the Oster-scheld, which runs by Bergen-op-zoom, and afterwards between the islands Beveland and Schouwer and a little below falls into the sea.

SHELLENBURG, a fortress of Germany, in the circle of Bavaria, situated on the Danube, twenty-two miles west of Ingolstadt.

SHELLING, an island of Holland, at the entrance of the Zuyder Sea, between Flie Island and Ameland: east long. $5^{\circ} 20'$, north lat. $53^{\circ} 34'$.

SCHEMNITZ, capital of the mine town in Upper Hungary, sixty miles north-east of Presburg.

SCHENECTIDA, a fortress of New York, in America, situated on Hudson River, in the province of Albany, hundred miles north of New York city.

SCHETLAND, or **SHETLAND**, about forty islands, which constitute part of the country of Orkney, or the Orkades in Scotland, valuable on account of the herring

herring-fishery on their shores: situated between 1° east, and 2° west longitude, and between 61° and 62° of north latitude.

CHEUCHZERIA, in botany, a genus of the hexandria-trigynia class of plants, having no corolla; the fruit consists of three roundish compressed inflated bivalve reflexo-distant capsules; the seed is single and oblong; there are sometimes six germina, and as many capsules, but three is the more natural and usual number.

CHINUS, in botany, a genus of the decandria-monogynia class of plants, the corolla whereof consists of five patent petals; the fruit is a globose berry, containing a large globose single seed.

CHIRAS, or **SHERAS**, a city of Persia, in the province of Fars, 180 miles south or Ispahan; reckoned the second city in that kingdom.

CHISM, a separation, or breaking off from communion with any church; on account of some disagreement in matters of faith or discipline.

Ecclesiastical history presents us with a view of several considerable schisms, in which large bodies of men separated from the communion of the church. Such were in the fourth century the schisms of the donatists, and the many sects that sprung up in the church, as the photinians, apollinarians, &c. the schism of the church of Antioch, occasioned by Lucifer, bishop of Cagliari, in Sardinia, in the fifth century, the schism of the church of Rome, between Laurentius and Symmachus: in the ninth century, the separation of the greek church from the latin; and particularly the grand schism of the popes of Rome and Avignon, in the fourteenth century, which lasted till the end of the council of Pisa, 1409.

The romanists reckon thirty-four schisms in their church, and bestow the name english schism on the reformation in this kingdom. Those of the church of England, again apply the term schism to the separation of the nonconformists, viz. the presbyterians, independents, quakers, &c. who contend for a further reformation.

CHOENUS, in botany, a genus of the triandria-monogynia class of plants, the proper corolla whereof consists of six permanent lanceolated acute and connivent petals, unequal in size and situation, disposed in a kind of imbricated manner, and the exterior ones shorter than the

rest; there is no pericarpium; the seed is single, glossy, of an oval, but somewhat triquetrous form, largest in the upper part, and contained till ripe in the corolla.

SCHOLASTIC, σχολαστικος, something belonging to the schools. See **SCHOOL**. Scholastic was a long time a title of honour, at first only given to such as distinguished themselves by their eloquence in declaiming, &c. After Nero, this appellation was bestowed upon advocates, and afterwards it became restrained to such as had the government of ecclesiastical schools, established under the first race of french kings, who instructed the clerks of the church first in the humanities, then in theology and the liturgy. Among the greeks, this was the name of an office or dignity answering to our divine or theologue.

Scholastic divinity, is that part or species of divinity which clears and discusses questions by reason and arguments, in which sense it stands, in some measure, opposed to positive divinity, which is founded on the authority of fathers, councils, &c. The school-divinity is now fallen into the last contempt, and is scarce regarded any where, but in some of the universities, where they are still by their charters obliged to teach it.

SCHOLIAST, or **COMMENTATOR**, a grammarian, who writes scholia, that is, notes, glosses, &c. upon antient authors, who have written in the learned languages. See the next article.

SCHOLIUM, a note, annotation, or remark, occasionally made on some passage, proposition, or the like. This term is much used in geometry, and other parts of mathematics, where after demonstrating a proposition, it is customary to point out how it might be done some other way, or to give some advice, or precaution, in order to prevent mistakes, or add some particular use, or application thereof.

SCHOOL, *schola*, a public place, wherein the languages, humanities, or other arts and sciences are taught. Thus we say, grammar-school, writing school, &c.

SCHWALBASH, a town of Germany, in the circle of the Upper Rhine, and in the territory of the Wetteraw, and county of Nassau, eight miles north of Mentz.

SCHWALBEA, in botany, a genus of the didynamia-angiospermia class of plants, the corolla whereof consists of a ringent single petal, the tube is of the length of

the

the cup, the limb is erect, the superior lip is erect, concave, and quite entire, the lower one is trifid and obtuse; the fruit is either a bilocular capsule, or there is no pericarpium; the seed is single, roundish, and small.

SCHWARTSBURG, a town of Germany, in the circle of Upper Saxony, and landgrave of Thuringia, eight miles south-east of Gotha.

SCHWARTZENBURG, a town of Germany, in the circle of Franconia, twenty miles east of Wurtzburg.

SCHWATS, a town of Germany, in the county of Tyrol, situated on the river Inn, twenty miles north-east of Inspruc.

SCHWEIDNITZ, a town of Bohemia, in the dutchy of Silesia, capital of a dutchy of the same name, situated twenty-five miles south of Breslaw.

SCHWEINFURT, an imperial city of Germany, in the circle of Franconia, and bishopric of Wurtzburg, situated on the river Maine, in east long. $10^{\circ} 15'$, north $50^{\circ} 15'$.

SCIÆNA, in ichthyology, a genus of the acanthopterygious class of fishes, the whole head and covering of the gills are scaly, and one of the laminæ of these coverings serrated at the edges, the body is compressed and broad, the back is acute, there are teeth in the jaws and fauces, the palate and tongue are smooth; there is only one fin on the back, which is divided in the middle to the very base; the tail is equal at the extremity; this genus comprehends the umbra and the umbrino.

SCIARRI, in natural history, the matter which runs down in burning torrents from the craters of volcanos, and which probably contains mineral and metallic particles, it being ponderous and hard. Some of the sciarrs are coarse, and others fine and polished on the surface; some of them are black, others grey, others reddish, and others of the colour of iron, and many of them have coverings of pure sulphur over their whole surface. They seem to be the result of many sorts of minerals melted together.

SCIATICA, the HIP-GOUT, a violent and obstinate pain in the hip, chiefly in the joint, where the head of the thigh-bone is received into the acetabulum of the coxendix. This pain will sometimes extend itself to the lower part of the loins, to the thigh, leg, and even the extremity of the foot, yet outwardly there is no swelling, no inflammation, nor change of colour in the skin; sometimes

there is such a spasm of the muscles the side affected, that the patient cannot stand upright without the utmost pain. When the sciatica has continued very long, there is such a collection of pituitous humour in the cavity of the joint that by relaxing the ligaments, it often causes a luxation. Sometimes it causes an aridura, or wasting away of the adjacent parts. When the pain leaves the hip, and moves downwards, it is a sign that the spasms are resolved; a violent motion of the body generally exacerbates the pain. This disorder may arise from the same cause with that which produces the gout; but it is most generally the effect of catching cold, or being exposed to the open air; it may also be occasioned by contusions and venereal disorders. See the article GOUT, &c.

After a gentle cathartic, or clyster, bleeding will be proper, especially in the ancients; also leeches applied to the hæmorrhoidal veins, have been found beneficial; Rhenish purges are hurtful, but mercurius dulcis with scammony, or some other purgative will be of service; some give mercurial emetics, and afterwards mercurial purgatives, repeated twice a week, or as occasion requires, for six times. If the patient is old, lenient purgatives will be most proper, and on intermediate days a dose of calomel, which is afterwards to be purged off, and so repeated alternately for some time. Outwardly, the linimentum saponaceum is recommended by Riverius, Junker, and others; the patient is to be anointed with it near the fire. Riverius says, he has known an obstinate sciatica cured in one day, by applying six cupping glasses on and about the part affected, and then anointing with oil of bricks hot, and afterwards covering it with a linen-cloth, made very hot. Zacutus Lusitanus affirms that the sciatica has been cured in a few hours, by applying eight or ten leeches to the part affected. Baglivi observes that if nothing else will do, recourse must be had to caustics, particularly the leaves of ranunculus, or a mixture of quicklime, and soft soap.

SCIENCE, *scientia*, in philosophy, denotes any doctrine, deduced from self-evident and certain principles, by a regular demonstration. See DEMONSTRATION METHOD, and KNOWLEDGE.

Sciences may be properly divided as follows: 1. The knowledge of things in their constitutions, properties, and operations.

rations: this, in a little more enlarged sense of the word, may be called φιλοσοφία, or natural philosophy; the end of which is speculative truth. See the article *Natural PHILOSOPHY*.

2. The skill of rightly applying these powers, *ἡγεμονία*: the most considerable under this head is ethics, which is the seeking out those rules and measures of human actions that lead to happiness, and the means to practise them; and the next is mechanics, or the application of the powers of natural agents to the uses of life. See *ETHICS* and *MECHANICS*.

3. The doctrine of signs, *σημειωτική*; the most usual of which being words, it is aptly enough termed logic. See the article *LOGIC*.

This, says Mr. Locke, seems to be the most general, as well as natural, division of the objects of our understanding. For a man can employ his thoughts about nothing but either the contemplation of things themselves for the discovery of truth; or about the things in his own power, which are his actions, for the attainment of his own ends; or the signs the mind makes use of, both in the one and the other, and the right ordering of them for its clearer understanding. All which three, *viz.* things, as they are in themselves knowable; actions, as they depend on us in order to happiness; and the right use of signs, in order to knowledge, being *toto cælo* different, they seem to be the three great provinces of the intellectual world, wholly separate and distinct one from another.

SCIENTIFIC, or **SCIENTIFICAL**, something relating to the pure, sublimer sciences; or, that abounds in science or knowledge.

SCILLA, the **SQUILL**, in botany, a genus of the hexandria-monogynia class of plants, the corolla whereof consists of six oval deciduous and very patent petals: the fruit is a smooth capsule, of a sub-oval figure, marked with three furrows, formed of three valves, and containing three cells: the seeds are numerous and roundish.

The middle part of the root of this plant is only used in medicine: the apothecaries cut the root perpendicularly in two; and separating the heart and the outer parts, they expose the others to dry: this root is extremely acrid, attenuant and dissolvent: it is apt to prove emetic in whatever form it is given, but this may

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be prevented by adding a few grains of cinnamon to it: it then becomes a powerful medicine in all obstructions of the viscera: it promotes urine and the menses, and cuts the tough phlegm which almost chokes in asthmas and many other disorders of the breast: the most usual form in which it is prescribed is that of the oxymel, made of a strong infusion of the root in vinegar, or made into a syrup of honey.

SCILLY, a cluster of islands and rocks, situated in the Atlantic-ocean: west longitude 7°, north latitude 50°.

SCIO, an island of Turkey, in the Archipelago, situated in east longitude 27°, north 38° 15'.

SCIOPTIC, a sphere, or globe of wood, with a circular hole or perforation, wherein a lens is placed. It is so fitted that, like the eye of an animal, it may be turned round every way, to be used in making experiments of the darkened room. See *CAMERA OBSCURA*.

SCIRE-FACIAS, in law, a judicial writ most commonly issued to call a person to shew cause to the court whence it issues, why execution of a judgment passed should not be made out; as where a plaintiff has recovered debt or damages in a court of record, and does not take out execution in a year and a day after judgment recovered: in that case he shall have this writ to summon the defendant to shew cause why execution should not be had against him upon the said judgment; which if the defendant does not, judgment is given and the plaintiff shall have execution. Where a plaintiff or defendant dies, execution may not be sued out on a judgment till the writ of scire-facias is brought and judgment given thereupon. A scire-facias must likewise issue where judgment is recovered against a feme sole who marries within the year and day, to summon the husband to shew cause, &c. And when a judgment is obtained against a testator, a scire-facias issues against the executor, though within a year after the judgment is had; and also against an administrator to an intestate.

SCIRO, an island of Turkey, in the Archipelago, situated east long. 25°, lat. 38° 15'.

SCIRPUS, in botany, a genus of the triandria-monogynia class of plants: there is no corolla nor pericarpium: the seed after every flower is single, and of a triquetrous figure, acuminate, and

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has

has villi or hairs on it longer than the cup.

This genus comprehends the club-rush and bul rush.

SCIRRHUS *emph.*, in surgery and medicine, a hard tumour of any part of the body, void of pain, arising from the inspissation and induration of the fluids contained in a gland, though it may appear in any other part, especially in the fat, being one of the ways wherein an inflammation terminates. See the articles **TUMOUR** and **INFLAMMATION**.

The seat of a scirrhus is very various, not being confined to the internal parts alone, *viz.* the liver, spleen, lungs, mesentery, pancreas, and, in females, to the uterus; but frequently happens to the external parts, as the lips, tongue, tonsils, fauces, palate, gum, neck, mammæ, axillæ, groin, penis, and testicles, and that generally after a previous inflammation of these parts. As soon as a scirrhus is formed, the neighbouring parts of course are impeded in the performance of their offices, and, according to the nature of the part affected, become subject to inflammations, exulcerations, cancer, gangrene, tabes, stiffness, immobility, or the like.

With regard to an external scirrhus, when it is of a long standing, and the patient infirm, Heister is of opinion that it is better to abstain entirely from any attempt to cure it, particularly if it is in the breasts of women, for fear the diseased part should become apparently cancerous. On the other hand, when the scirrhus is but newly formed, attended with no vehement pain or hardness, and when the patient is otherwise of a sound habit of body, external and internal remedies may be used to set the confined fluids at liberty. The internal remedies which are found principally serviceable in answering this intention, are the decoction of the woods, digestive tinctures or essences, and mild mercurials, giving between whilst relaxing medicines to resolve the inspissated humours. With regard to external resolvents, plasters claim the first place, such as are made with the warm gums, as gum ammoniac, galbanum, opopanax, sagapenum, &c. which may be applied alone or mixed together; the next place is held by cataplasms: some highly recommend acid vapours in this case, and to receive the steam of boiling vinegar upon the diseased part: others set sulphur on the fire, and hold

the part over the fume: others, again, are fond of fumigations of cinnabar; but mercurial medicines perform wonders in this case. But if all medicines should prove unsuccessful, and the scirrhus is free and moveable, and its situation threatens no great danger from the neighbouring vessels, and that the strength of the patient will be sufficient to undergo the operation, to prevent the case from turning cancerous, it must be cut out with a knife, after which the wound must be dressed with the linimentum arcei, or any other vulnerary medicine and healed as other wounds. See the article **WOUND**.

For the methods of preventing the part from turning cancerous, see the article **CANCER**.

When this disorder seizes the internal parts, and the several symptoms cannot be discovered by the senses, in that case the effects of a scirrhus are only capable of guiding the physician's judgment and directing his practice: but obscure cases of this nature are illustrated by a consideration of the following circumstances. If the cause pre-disposing to the generation of a scirrhus, is an atrabilious spissitude of the humours arising from a long protracted use of austere, terrestria and coarse aliments without violent exercise, or from a long continued influence of passion, especially grief; and if at the same time, the efficient cause is contusion; if an inflammation, is neither resolved nor changed into a suppuration; if the usual discharge of the menses, or hæmorrhoides, is suppressed; or if the taint is hereditary, we may justly from such causes dread an internal scirrhus. When after a mature consideration of all circumstances, it is probable that a scirrhus is capable of resolution, emollients which relax the vessels, and resolvents which, without exciting a great commotion, fuse the concentered humours are the only medicines to be used. Aretæus affirms, that in order to remove a scirrhus, or hardness of the spleen, we are to use medicines as hot as fire. In a recent scirrhus of the liver, Junke directs that the bowels be cleansed and relaxed by a clyster made of a decoction of mallows, camomile-flowers, mullein and fennel-seed. After this, bleeding in the foot is to be ordered, and then the nitrous and other resolvent medicines are to be given, such as tartar of vitriol and the like. After this, medicated wines should

be given as the common drink, prepared with byrrony and arum-roots, centaury, hyssop, and maidenhair-leaves, saffraſas, fenna, black hellebore, and rhubarb: and externally, plaſters of the reſolvent and ſtrengthening kinds are to be applied. It is ſaid that no internal medicine is more efficacious than vinegar ſaturated with an highly pure alkaline ſalt; or, if to a pint of rheniſh-wine we add half an ounce of the ſalt of carduus benedictus, or the ſtalks of beans, or ſome ſuch ſubſtance, of which mixture the patient is to take half an ounce three or four times a day.

The efficacy of quickſilver in removing obſtructions is univerſally acknowledged, and both the external and internal uſe of it has often greatly contributed to the cure of a benign and incipient ſcirrhus; for when it has acquired a ſtony hardneſs, and begins to be malignant, no relief can be expected from the ſtrongest mercurial preparations, nor from a ſaliſation excited by quickſilver, but all the ſymptoms are rather increaſed by theſe means; and in conſequence of the increaſed motion of the humours, the ſcirrhus is the ſooner changed into a cancer: and after all directions for the treatment, it is to be acknowledged that an obdurate and inveterate ſcirrhus admits of no remedy.

CISSARS, a well known inſtrument for cutting any thing aſunder. See the article **FORCEPS**.

SCITE, or **SITE**. See the article **SITE**.

SCIURUS, the **SQUIRREL**. See the article **SQUIRREL**.

SCLAREA, in botany, the name by which Tournefort calls ſeveral ſpecies of ſalvia, or ſage. See the article **SAGE**.

SCLAVONIA, a province ſubject to the houſe of Auſtria, and bounded on the north-eaſt by the rivers Drave and Danube, which ſeparate it from Hungary; being about two hundred miles long, and ſixty broad.

It takes its name from the Sclavi, an ancient people of european Scythia; from whom is likewiſe derived the ſclavonic language, which is ſaid to be the moſt extenſive language in the world, except the arabic; as being the common mother of the ruſſian, hungarian, poliſh, bulgarian, carinthian, bohemian, &c. languages.

SCLERANTHUS, **KNAWEL**, in botany; a genus of the decandria-digynia claſs of plants, without any flower petals: the fruit is an oval capſule, contained in the

baſe of the cup, which is cloſed at the neck; and the ſeeds are two, convex on one ſide and plane on the other.

The hoary-perennial-knawel is the plant, at the roots of which is found the coccus polonicus, a very valuable ſcarlet dye. See **COCCUS** and **SCARLET**.

SCLEROPHTHALMIA, in medicine, a ſpecies of ophthalmia, wherein the eye is dry and inflamed, as are alſo the eyebrows. See **OPHTHALMIA**.

SCLEROPTERA, in natural hiſtory, the name of that claſs of inſects which have four wings, the exterior flexible, and the interior membranaceous; and which have the aperture of the mouth bent under the breaſt.

SLCEROTICA, in anatomy, one of the tunics, or coats, of the eye: it is hard, opaque, and extended from the cornea to the optic nerve; its forepart is tranſparent, and called the cornea. See the articles **EYE**, **CORNEA**, and **TUNICA**.

SCLEROTICS, medicines proper to harden and conſolidate the fleſh of the parts to which they are applied; as purſlain, houſe-leek, flea-wort, garden-nightshade, &c.

SCOLOPAX, the **WOOD-COCK**, in ornithology, a ſpecies of numenius, with a black line on each ſide the head: it is a very beautiful as well as delicate bird, ſomewhat ſmaller than the partridge; the upper part of its body being of a mixed colour, mottled with black, grey, and a reddiſh-brown: the breaſt and belly are a pale-grey, with little tranſverſe lines of a bright brown: the upper part of the throat is of a whitish-yellow, and the hinder part of the head chiefly black, with a few tranſverſe lines of brown on it: the male is ſomewhat darker than the female, in its general colouring. See **NUMENIUS**.

SCOLOPENDRA, in zoology, an inſect with a very ſlender and long body, and furniſhed with a vaſt number of legs.

According to Dale, it is ſometimes uſed as a depilatory boiled in wine.

SCOLYMUS, in botany, a genus of the ſyngeneſia-polygamia-æqualis claſs of plants, with a paleaceous receptacle, and imbricated cup, and no down: the flower is compoſed of a number of ſemifloſcules, each placed on an embryo-ſeed.

SCOMBER, in ichthyology, a genus of the acanthopterygious order of fiſhes, the tail of which is very much forked, ſo as to repreſent the figure of a crenſcent: there are ſeven offiſes in the branchioſtege membrane

brane, on each side; the uppermost of which is covered by the operculum of the gills. This genus, besides the common mackerel, comprehends the tunny, the horse-mackerel, and several other species. See MACKREL, TUNNY, &c.

SCONCE, in fortification, a small field-fort, built for the defence of some pass, or other pass. See the article FORT.

SCONE, or **SCOON**, a town of Scotland, near Perth, remarkable for being the place where the kings of Scotland were crowned.

SCOPARIA, in botany, a genus of the tetrandria monogynia class of plants, the calyx of which is a single leaved, concave, perianthium, cut into four slender segments; the corolla is a single, patent, concave petal, divided into four equal obtuse segments; the fruit is an oblong, conic, acuminate capsule, formed of two valves, and containing only one cell, in which are lodged many oblong seeds.

SCOPER, or **SCUPER-HOLES**, in a ship, are holes made through the sides, close to the deck, to carry off the water that comes from the pump. These holes, in the lower deck, have round leathers nailed over them to keep the sea-water from coming up into the ship; these are called scoper-leathers, and the short-nails with broad heads, which fasten these leathers down, are called scoper-nails.

SCOPS, in ornithology, an extremely elegant species of owl, about the size of a field-fare, with the head aurited by two single feathers.

SCORBUTUS, the **SCURVY**, in medicine. See the article SCURVY.

SCORDIUM, **WATER-GERMANDER**, in botany, is comprehended by Linnæus among the teucriums. See TEUCRIUM. It is celebrated for its sudorific and alexipharmic virtues, and is accordingly prescribed in malignant disorders: but it is never used alone, being only kept in the shops as an ingredient of the confectio Fracastorii, which takes its name of diascordium from it. See DIASCORDIUM.

SCORE is sometimes used to denote the number twenty.

SCORE in music, denotes partition, or the original draught of the whole composition, wherein the several parts, *viz.* treble, second treble, bass, &c. are distinctly scored and marked. See the articles PARTITION and MUSIC.

SCORIA, or **DROSS**, among metallurgists, is the recrements of metals in fusion; or, more determinately speaking, is that

mass which is produced by melting metals and ores, and when cold is brittle and not dissoluble in water; being properly a kind of glass.

Some authors call by this name that saline mass which is produced by melting ores and metals together with saline and reducing fluxes. But the word *scoria* is not properly to be understood of all this mass, but only of the vitrified particle which are lodged between, and adhere to the small masses of the salts, and which may be separated from them by water. See the next article.

SCORIFICATION, in metallurgy, is the art of reducing a body, either entirely or in part, into scoria.

It is used by metallurgists, in order that any metal, imprisoned in any solid body may, on account of its weight, descend and separate itself therefrom; and finally if that be required, be either wholly or in part converted into scoria. All fixed bodies are subject to this alteration, not totally excepting even gold and silver. There are also, among the volatile bodies, some that may be fixed, and which assume the name of scorix, by adding fixed bodies to them.

It is often proper to make this scorification in a vessel that may absorb the scorix, and retain only the metallic part of the mass under trial. In this case the operation is called coppeling; and vessels made of ashes, called tests and coppels serve for this purpose. It is evident, in these processes, that a great attenuation of the scorix is necessary, that they may be able to pass through the vessel; nor is there any fitter body to promote this operation than lead, which, by its undergoing itself a like attenuation in the fire, disposes other bodies to be reduced into a subtle scorix for the same attenuation. See COPPEL and COPPELLING.

SCORPÆNA, in ichthyology, a genus of the acanthopterygious order of fishes, the characters of which are these: the branchiostegemembrane, on each side, contains seven bones: the head is large and very prickly: there is only one back-fin, and that is lower in the middle than elsewhere: the body grows small towards the tail: the eyes are placed near one another, and are covered with the common skin: there are teeth in the jaws, palate, and fauces; and the appendices to the pylorus are eight or nine.

There are only two species of this genus, *viz.* the scorpæna with pinnules at the eyes.

eyes and nostrils; which very much resembles the common perch, and is also called scorpio, and scorpius minor; and the red scorpena, with numerous cirri, which is thrice the size of the former species.

SCORPIO, the **SCORPION**. See the next article.

SCORPION, *scorpio*, in zoology, a genus of wingless insects, the body of which is of an oval figure; the tail is long and slender, and the whole body covered with a firm and somewhat hard skin: the eyes are eight in number, two of which are placed contiguous, and fix side ways: the legs are eight; and there are also a pair of claws at the head, and a pointed weapon at the extremity of the tail. See pl. CCXL. fig. 4. n° 3. which represents the great yellowish barbary scorpion, with eight denticulations; and when full grown, measures six or seven inches in length: there are several other species.

SCORPION, *scorpio*, in astronomy, the eighth sign of the zodiac, denoted by the character ♏. See **SIGN** and **ZODIAC**. The stars in the constellation scorpio, in Ptolemy's catalogue, are 20: in Tycho's 10: and in Mr. Flamsted's 49.

SCORPION, in the antient art of war, an engine chiefly used in the defence of the walls of fortified places, by throwing arrows, fire-balls, or great stones. See plate CCXL. where fig. 4. n° 1. represents one of these machines charged, and n° 2. one in its natural situation; the point A of the longest brachium, AC, is kept uppermost by the boxes of stones BB: hence, in order to charge it, the point A being brought down by the rope RR, and loop α , drawn by means of the wheel W, and pinion at I, round the rollers LM, is detained by the pin HH. Then the loop α being taken off from A, and the sling S charged with the ball or stone T, the scorpion is ready to be discharged; which is done by a smart blow of an hammer on the end of the pin HH, or by suddenly pulling it out by a rope; for then the point A rises with great velocity, and one of the loops of the sling slipping off, the stone T flies out, as represented in n° 2. which is another scorpion, differing a little from that represented in n° 1; the discharging end, A, being nearer to the axis of motion, DD, in the former than in the latter: in both, the scorpion turns upon the pivot C; as the whole frame HI turns round the up-

right shaft Cc, that the machine may be directed any way. The hook H, in n° 2. does the office of the pin H in n° 1. It appears, from Cæsar's Commentaries, that the Romans had great numbers of scorpions in their camps: but however powerful these machines were, and however numerous, yet they are not to be compared with a battery of cannon, either for force or expedition.

Those who desire a more particular account of this machine, may consult Defaguliers's *Experim. Phil.* vol. i. p. 72 and 73.

SCORPIURUS, **ROUGH-CATERPILLARS**, in botany, a genus of the diadelphiadecandria class of plants, with a papilionaceous flower; and its fruit is a contorted pod, somewhat resembling a caterpillar.

This genus comprehends the scorpioides and campoides of authors.

SCORZONERA, **VIPER'S-GRASS**, in botany, a genus of the syngenesia-polygamia-æqualis class of plants, with a compound imbricated flower, made up of a great many monopetalous, ligulated, and quinque-dentated small ones: the stamina are five very short capillary filaments: there is no pericarpium, except the imbricated cup, which becomes connivent, and contains a single oblong and striated seed after each lesser flower: the seeds are crowned with a plumose down. See plate CCXLII. fig. 2.

The roots of this plant abound with a milky juice, of a bitterish subacid taste; and hence may be of some service for strengthening the tone of the viscera, and promoting the fluid secretions. They were formerly celebrated as alexipharmics, and for expelling the measles and small-pox; but have, of late, almost lost their character in these intentions.

SCOT, *scotta*, a customary contribution laid upon all subjects according to their abilities. Whoever were assessed to any contribution, though not by equal portions, were said to pay scot and lot. See the article **LOT**.

SCOTIA, in architecture, a semicircular cavity or channel between the toes, in the bases of columns. See the articles **COLUMN** and **BASE**.

The Scotia has an effect just opposite to that of the quarter-round. Our workmen frequently call it the casement.

It is also called trochilus, partly from its form. See **TROCHILUS**, &c.

In the ionic and corinthian base, there are

are two scotias, the upper whereof is the smaller. See IONIC and CORINTHIAN. According to Felibien, the cavetto is a fourth part of the scotia. See the article CAVETTO.

SCOTISTS, a sect of school-divines and philosophers, thus called from their founder J. Duns Scotus, a Scottish, or as others say, an Irish cordelier, who maintained the immaculate conception of the virgin, or that she was born without original sin, in opposition to Thomas Aquinas and the Thomists. See THOMISM. As to philosophy, the Scotists were like the Thomists, only distinguished by this, that in each being, as many different qualities as it had, so many different formalities did they distinguish, all distinct from the body itself, and making as it were so many different entities, only those metaphysical, and as it were super-added to the being.

SCOTLAND, exclusive of the islands, is situated between 1° and 6° west long. and between $54^{\circ} 30'$ and $58^{\circ} 30'$ north lat. being about three hundred miles long, from north to south, and from fifty to one hundred and fifty miles broad, from east to west.

Since the union with England, Scotland is divided into thirty-three shires, or counties, which altogether send only thirty knights to parliament, by reason the shires of Bute and Cathness choose only alternately, or every other parliament, in their turns; as do those of Cromarty and Nairn, Clackmannan and Kinross.

The royal boroughs of Scotland are sixty-five, but so classed as to send only fifteen burgesses to parliament.

New SCOTLAND, *Nova Scotia*, one of the british colonies in North America, is situated between 62° and 72° west long. and between 43° and 51° north lat. being bounded by the river of St. Laurence on the north and north-west; by the bay of St. Laurence, and the Atlantic Ocean on the east; by the same ocean and New-England on the south; and by Canada on the west.

SCOTOMIA, or **SCOTOMA**, in medicine, a dizziness or swimming in the head, wherein the animal spirits are so whirled about, that external objects seem to turn round. See the article VERTIGO.

SCRATCH, in the language of the salt-workers of our country, the name of a calcarious, earthy, or stony substance,

which separates from sea-water in boiling it for salt. This forms a thick crust, in a few days, on the sides and bottoms of the pans, which they are forced to be at the pains of taking off once in a week, or ten days, otherwise the pans burn away and are destroyed. See the article SALT.

SCRATCH PANS, in the English salt-works, a name given to certain leaden pans, which are usually made about a foot and half long, a foot broad, and three inches deep, and have a bow, or circular handle of iron, by which they may be drawn out with a hook, when the liquor in the pan is boiling. See SALT. The use of these pans is to receive a calcarious earth, of the nature of that which incrusts our tea-kettles, which separates from the water in boiling; this substance they call scratch; and these pans, being placed at the corners of the salt-pan, where the heat is least violent, catch it as it subsides there.

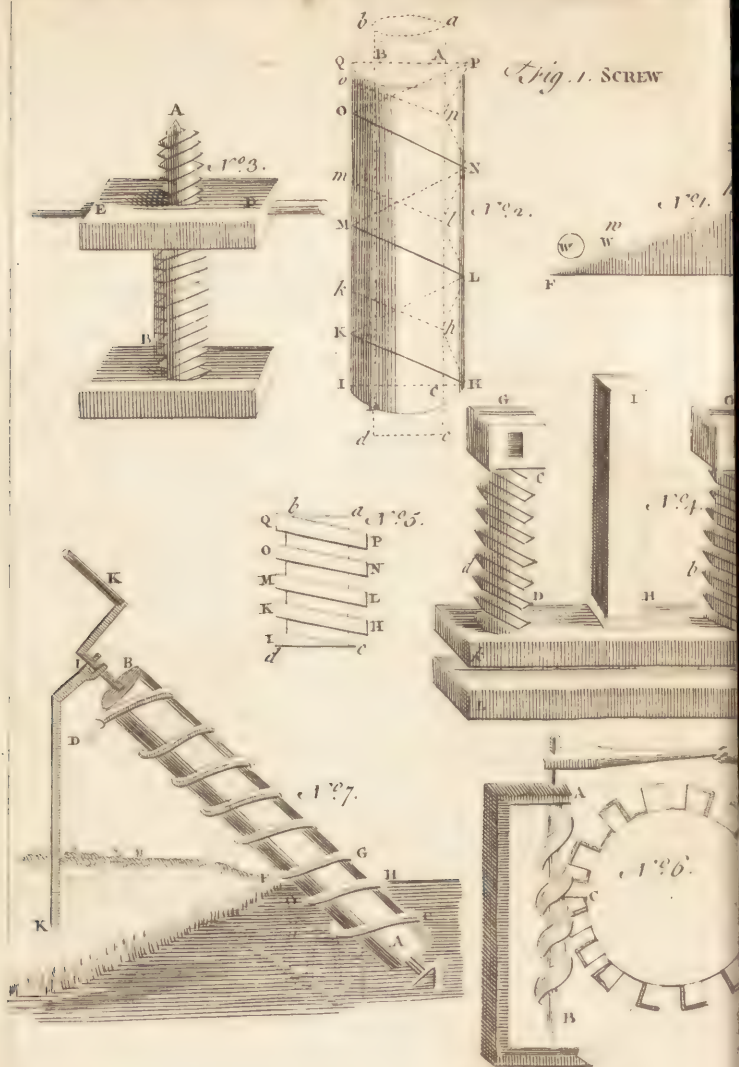
SCRATCH-WORK, *sgraffiata*, a way of painting in fresco, by preparing a black ground, on which is laid a white plaister, which white being taken off with an iron bodkin, the black appears through the holes, and serves for shadows. See the article SGRAFFIT.

This kind of work is lasting, but, being very rough, is unpleasant to the sight.

SCRATCHES, among farriers, a distemper incident to horses, consisting of dry scabs, chops, or rifts, that breed between the heel and the pastern-joint. There are various kinds of scratches, distinguished by various names, as crepances, rats tails, mules, kibes, pains, &c. which are all so many species of the same malady, engendered from some dry humour falling on the legs, or from the fumes of the beasts own dung lying under his heels, especially after a journey from over-hard riding, &c. This disorder begins first with dry scabs in the pastern joint in several forms. It is known by the staring, dividing and curling of the hair on the spot.

SCREW, or **SCRUE**, *coclea*, one of the five mechanical powers. A screw is a cylinder cut into several concave surfaces, or rather a channel or groove made in a cylinder, by carrying on two spiral planes the whole length of the screw, in such a manner, that they may be always equally inclined to the axis of the cylinder in their whole progress, and also always inclined





inclined to the base of it in the same angle.

The screw may also be considered as a wedge carried round a cylinder, which in that case is called the arbor of the screw; the wedge, so carried on, making what is called the thread of the screw, as may be seen in plate CCXLII. fig. 1. n° 1, 2, 3, 4, and 5. The arbor of the screw being AB in n° 1. and $abcd$ in n° 2. as if the cylinder $ACBD$ was inscribed within the screw. Here, we may see the manner how a screw is made; for if it be cut out of the cylinder $PHIQ$, then $HKL MNOP$ is a spiral line going about the cylinder, making the prominent part to be left of the said cylinder; and $hklmno$, the line marking the depth to which the screw is to be cut, supposing the same line to go round the inner cylinder or arbor $ABCD$, though not expressed here, to avoid confusion; and then $bLlNn$, &c. will represent the prominent part or thread of the screw. Now, if instead of cutting the hollows HbL , LlN , NnP , &c. into the cylinder $PHIQ$, a continued wedge be fixed to a smaller cylinder as $ACBD$, or rather $abcd$, the same kind of screw will be made, and $abcd$ will be the arbor of that screw. Sometimes the most prominent part of the thread, as LN , &c. is not sharp but flat, and then the thread is called a square thread, as in (n° 5.) which represents the section of such a screw. This sort of thread is not used in wood, but in iron, and in other metals; it is of good service, being commonly more durable, and raising the weight with more ease than the sharp thread.

Force of the SCREW. To make an estimate of the force of the screw, which may be compared either to an inclined plane, or to a wedge, according as its arbor does or does not advance in a progressive motion whilst it turns round its axis to raise or stop a weight, or to press bodies together, which are the several uses of a screw, let us take a flexible wedge, as, for example, one of paper, and coil it round a cylinder, (*ibid.* n° 1.) as is represented in the figure, where AB is the arbor, CID one thread or helix, DHE another, and ETG part of the wedge left to shew the proportion between the power that turns the screw and the weight W .

If the weight is pushed up the wedge, (or, which is the same thing, raised perpendicularly by the wedge slipping under

it) from F to H in the direction Ww , then will HG be the velocity of the weight, and GT the velocity of the power, which is the case of the inclined plane becoming a wedge; and this will be the analogy for the screw thus acting. As a circle whose diameter is Hb : to HI the distance of two threads :: (or as the base FG : to the perpendicular HG ::) so is the weight: to the power applied to the arbor at A , to raise a weight up the thread $HDIC$.

N. B. We suppose the diameter of the arbor at A and of the screw at H nearly equal.

This is the case of n° 4. where the moveable plank DK is carried down, by turning round the heads GG of the screws AB and CD , in order to press strongly the bodies placed between the planks DK and ML , whilst the piece HI , fixed on the upper plank, is either guided through an hole, or, being only looked at, serves to shew whether the plank KD be brought down horizontally, as the screws are turned. When long levers are thrust into the square holes at the heads of the screws, the force of the screws is much increased, and then the weight will be to the power :: as the circumference of the circle described by that part of the lever to which the hand is applied: to the distance between two threads. Wherefore, as the circumference of the circle is to the distance of two thirds of an endless screw :: so is the resistance of the teeth of the wheel: to the power applied to the handle.

Archimedes's SCREW, in hydraulics, a kind of spiral pump, for raising water, so called from its inventor Archimedes.

It consists of a long cylinder, with a hollow pipe, tube, or groove coiled round it, as represented in *ibid.* n° 7. where AB represents the cylinder, and CD the tube open at each end. It is placed in an oblique position to the horizon, with the lower end in the water to be pumped away, the other end being supported on the lower part of the winch IK , by which the screw and cylinder are turned round.

As soon as the screw is immersed in the water, it immediately rises therein by the orifice C to the level of the surface of the water EF ; and if the point of the helix or spiral, which in the beginning of the motion is coincident with the surface of the water, happens not to be on the lower side of the cylinder, the water will

will upon the motion of the screw, move on in the spiral, till it comes to the point which is on the other side, and coincident with the surface of the water; when it is arrived at that point, which suppose at O, it cannot afterwards possess any other part of the spiral than that which is upon the lowest part of the cylinder; for it cannot move from O towards H or G, because they are situated higher above the horizon; and since this will constantly be the case, after the water in the spiral has attained the point O, it is plain that it must always be on the under side of the cylinder.

But because the cylinder is in motion, every part of the spiral-screw, from O to D, will, by degrees, succeed to the said under part of the cylinder; the water, therefore, in the spiral, must succeed to every part thereof, from O to D, as it comes on the lower side; that is, it must ascend on the lower part of the cylinder through all the length of the pipe, till it comes to the orifice D, where it will run out, as having nothing farther to support it. Hence it appears how much those gentlemen are mistaken who, affecting the wonderful, say, 'That the water ascends by descending;' whereas, if they would have made the most of the wonder, they might have truly said, 'That the water ascends because it cannot ascend,' *i. e.* that it ascends one way, because it cannot ascend another; but then the wonder is lost.

Endless or perpetual-SCREW, one so fitted in a compound machine, as to turn a dental wheel; so called, because it may be turned for ever without coming to an end; *ibid.* n° 6.

If in the endless, or perpetual-screw, AB, whose threads take the teeth of the wheel CD, you take the distance of two threads, according to the length of the axis AB; or the distance of two teeth in the wheel CD, in the direction of the circumference; and if a weight, W, act at the circumference of the wheel: then, if the power D be to the weight W, as that distance of the teeth or threads, to the length described by the power P in one revolution, the power and weight will be in æquilibrium; because in one revolution of P, the wheel DC, with the weight W, has moved only the distance of one tooth.

SCRIBE, an officer among the Jews whose business was to write; of which there were three kinds; the first and princi-

pal of which were the scribes of the law whose office was to write and interpret scripture; these were in great credit and esteem among the Jews, and had even the precedence of the priests and sacrificers, and their decisions were received with almost the same respect as the law of God itself; the second kind, properly called scribes of the people, were a sort of magistrates; and the third were public notaries, or secretaries of the council; which were the least considerable.

The scribes, among the Romans, wrote out decrees, or acts, and made out authentic copies of them.

SCRIBING, in joinery, &c. is a term used when one side of a piece of stuff is to be fitted to another that is irregular. In order to make these join close all the way they scribe it; that is, they lay the piece to be scribed close to the other they intend to scribe it to, and opening their compasses to the widest distance these two pieces stand from each other they bear the point of one of the legs against the side they intend to scribe to, and with the other point draw a line on the stuff to be scribed. Thus they form a line on the irregular piece parallel to the edge of the irregular one; and if the stuff be cut exactly to the line, when these pieces are put together they will form a joint.

SCRIPTURE, an appellation given, by way of eminence, to the sacred and inspired writings of the Bible. See the articles BIBLE, CANONICAL, &c.

SCRIVAN, a port-town of the province of Darien, in Terra Firma, fifty miles east of Porto Bello.

SCROPHULA, the KING'S EVIL, in medicine, a hard glandulous humour, usually of the same colour with the skin, seated principally in the sides of the neck, behind the ears, and under the chin; but though the principal seat of this disease is in the sides of the neck, scarcely any part of the body is exempted from it. The humour sometimes falls on the lungs, and brings on a pulmonary consumption; and it is a dreadful circumstance, that this disorder is transmitted from parents to their children, by way of inheritance. As to the cure of this stubborn disease, says Dr. Mead, it is to be attempted by bleeding, purging and such medicines as are most proper for correcting the viscosity, saltness, and acrimony of the humours. Of cathartics, the best is dulci-

fied

fied mercury six times sublimed, which should be joined with rhubarb, for children; but to adults it may be given alone, with a gentle purging draught some hours after it. The next to this in virtue is jalap: and our purging waters are also useful, as they scour the glands and open the body at the same time. In fine, a pill composed of mercury six times sublimed, and precipitated sulphur of antimony, each one grain; of aloes, three or four grains; made up with the syrup of balsam, and taken every night, will be found serviceable, not only in this disease, but in others arising from viscid humours.

For correcting this depravity of blood and humours, the following powder may be taken twice a day, with three or four glasses of the less compound lime-water: take of burnt sponge, one scruple; of purified nitre, coralline, and white sugar, each ten grains; mix them together; and if the patient happen to be emaciated, equal quantities of milk may be mixed with the water. The expressed juice of millepedes will also be of some service, on account of their diuretic quality. Issues likewise will be beneficial, to drain off the viscid humour; and a change of aliment is often attended with good effects.

As to the patient's diet, which ought not to be neglected, let him feed on flesh of easy digestion, and abstain from all salt and smoke-dried meat and high-seasoned things; and particularly from pork, hare, cheese, and in general from all things that are hard of digestion. Let him drink river-water, and that boiled; but stagnating or snow-water never.

For the manner of treating scrophulous tumours, by outward applications, see the article SCIRRHUS.

SCROPHULARIA, FIGWORT, in botany, a genus of the didynamia-angiospermia class of plants, with a monopetalous flower, divided into five segments at the limb: the fruit is a roundish bilocular capsule, containing a great many small seeds. The root of this plant is esteemed externally, as a remedy for the piles, and for the king's evil-sores: it is generally made into an ointment for these purposes; for some give it also internally, in diet-drinks.

SCROTUM, in anatomy, the capsula or bag in which the testicles are contained, and which hangs down below the penis. See the article TESTICLE.

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The scrotum is composed of a cuticula, cutis, and a musculous membrane called the dartus, by means of which it is contracted. It has in the midst a septum, formed by a duplicature of the dartus, by which it is divided into two cells, and which answers to a longitudinal suture, by which it is externally divided into two sides, a right and a left. It has its vessels from the hypogastrics, and its nerves from the os sacrum.

Its use is to contain, to cherish, and defend the testicles.

SCROTUM CORDIS, the same with pericardium. See PERICARDIUM.

SCROWLS, or **SCROLLS**, in architecture, the same with volutes. See VOLUTE.

SCRUPI, in natural history, a class of fossils, formed into large detached masses without crusts, and composed of a variously debased crystalline matter. Of this class there are two orders, and under these four genera, *viz.* the first order comprehend those scrupi, of a more rude and irregular structure in the mass, as the tclaugia; and the second order comprehends those of a more equal and regular constitution, as the petridia and the jaspides. See TELAUGIA, &c.

SCRUPLE, a weight equal to the third part of a dram, or to twenty grains. See the article WEIGHT.

Among goldsmiths it is equal to twenty-four grains.

The scruples of the moon, &c. eclipsed, are the parts of the moon's diameter immersed in the shadow, expressed in the same measure wherein the apparent diameter of the moon is expressed.

The scruples of half duration are an arch of the moon's orbit, which the center of the moon describes, from the beginning of an eclipse to its middle. Scruples of immersion, are an arch which the moon's center describes, from the beginning of the eclipse to its middle. And scruples of emersion, are an arch of the moon's orbit, described by her center from the time of the emersion of her limb to the end of her eclipse. See ECLIPSE.

SCRUTINY, a strict examination of the several votes taken at an election, in order to discover unqualified voters. See the article ELECTION.

SCULPTURE, an art by which, in taking away, or adding to matter, all sorts of figures are formed by the hand, either in stone, wood, wax, or metal. In its full latitude it signifies both the art of working in creux, properly called engraving,

and of working in relieve, which is more strictly called sculpture. See the articles ENGRAVING and RELIEVO.

The first works in sculpture were with clay, not only in making statues, but in forming models; and to this day a sculptor never undertakes any thing considerable, without forming a model, either in clay or wax. In making figures of these materials, they begin and finish their work with their hands, using only three or four pieces of wood, which are roundish at one end, and at the other flat, with a sort of claws and teeth, which are to smooth and scratch the work. For waxen models, to every pound of wax add half a pound colophony; some add turpentine, and melt it together with oil of olives; more or less of the latter being used as they would have the matter harder or softer: some also add a little vermilion, to give it a colour: this is wrought and moulded with the fingers like clay. See the article MOULDING.

For sculpture in wood, which we properly call carving, the first thing required is to choose wood proper for the work the sculptor is to perform. If it be any thing large, and that requires a great deal of strength and solidity, the hardest and most durable wood is to be chosen; and for smaller works and ornaments, the softer wood is used; but it must be such, however, as is firm and close: for a large work, though it be only a single figure, it is better to make use of several pieces of wood, or bits of board, glued together, than of one whole piece, which is more liable to crack; for a thick piece of wood may not be dried to the heart, however it may appear on the outside. Carving is performed with a great variety of chisels and other tools, for paring, scooping, rounding, &c. the several parts of the work, see *Cutting in WOOD*.

In sculpture in marble and other stone, the first thing to be done is to saw out a block of marble, of the bigness of the work to be performed; and this being done, the superfluities are to be taken off by a stubbed point and a heavy mallet; thus, bringing it near the measures required, the sculptor reduces it still nearer with a finer tool, called a dog's tooth, it having two points, but one not so sharp as the other. After this he makes use of his gradine, which is a flat cutting tool, with three teeth; he then takes off, with a smooth chisel, the scratches the gradine left on the marble, and uses it with dex-

terity and delicacy, to give softness and tenderness to his figure; till at length taking rasps of different degrees of fineness, the work is gradually rendered fit for polishing. To polish the work, the sculptor uses pumice-stone and smalt, then he goes over it with tripoli; and when he would give it more lustre, rubs it with leather and straw-ashes. There are several other tools used by sculptors, adapted to the different parts of the work, and the nature of the stone they make use of. As the models of clay shrink as they grow dry, whenever sculptors undertake a considerable piece of work, they only use the model for making a mould of plaister or stucco, in which is formed a figure of the same matter, which serves them thenceforth for a model, and by which they adjust all their measures and proportions. To proceed the more regularly, on the head of the model they place an immoveable circle divided into degrees, with a moveable rule or index, fixed in the center of the circle, and divided also into equal parts: from the end of the rule hangs a line with a plummet, which serves to take all the points, to be transferred thence to the block of marble, from whose top hangs another plummet, like that of the model. But there are some excellent sculptors, who disapprove of this method; urging, that the smallest motion of the model changes their measures, for which reason they choose rather to take all their measures with the compasses. See the articles POLISHING, &c.

SCUM properly denotes the impurities, which a liquor, by boiling, casts up to the surface. See CLARIFICATION.

The term scum is also used for what is more properly called the scoria of metals. See the article SCORIA.

In this last sense, the scum of lead is a sort of smalt, of various colours; and the scum of silver is commonly what we call litharge. See SMALT and LITHARGE.

SCUPER, or SCOPER-HOLES, in a ship. See the article SCOPER.

SCURRA, in ornithology, the name by which the ancients called the jackdaw.

SCURRULA, in botany, a genus of the tetrandria monogynia class of plants, without any calyx; the corolla is monopetalous, tubulous, and semiquadrifid; the fruit is a turbinate berry, roundish at top; the seed is not described.

SCURVY, *scorbutus*, in medicine, Dr. Mead observes, is the name given by medical



The SECTOR

Fig. 1.

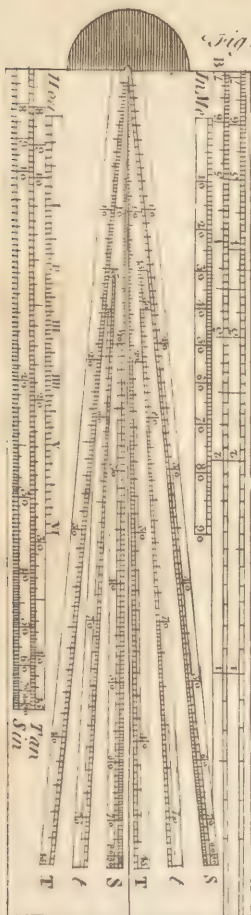


Fig. 2.

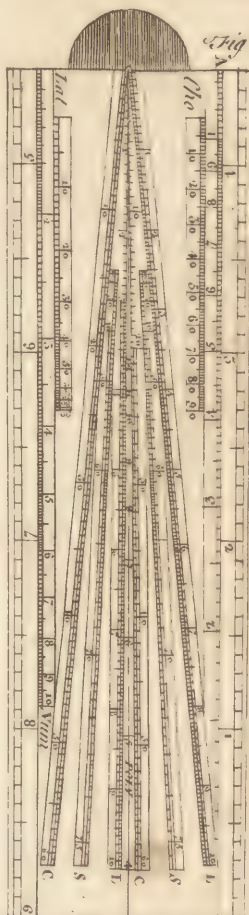
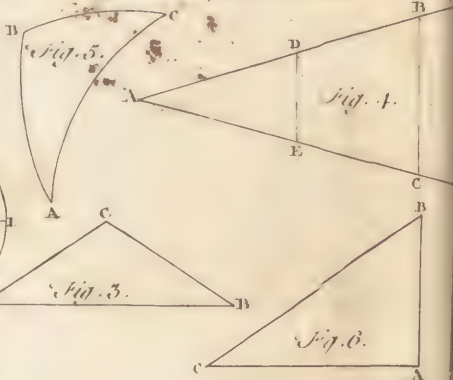
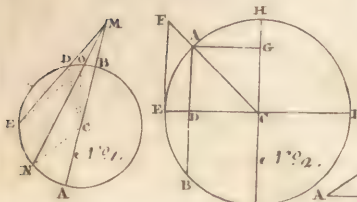


Fig. 7. SECANT



dical writers to a disease so various and different in appearance, that it does not seem to be one and the same distemper.

Boerhaave observes that the scurvy chiefly affects the inhabitants of cold northern countries, especially those who live in marshy, low, fat, and moist soils, near stagnating waters, whether fresh or salt. Those who live idle sedentary lives are most subject, chiefly in the winter-time, to the attacks of this distemper; as also those feeding upon salted and smoke-dried flesh, or fish, sea-biscuit, stinking water, unfermented farinaceous vegetables, peas, beans, sharp, salt, old cheese; likewise those who are subject to melancholic, maniacal, hysteric, or hypochondriacal disorders; or those who have taken large quantities of the peruvian bark without proper evacuations. Dr. Pringle considers the scurvy as arising from a putrid cause only; and thinks that the species of that malady, said to be owing to an acid, is so far from being so, that it were to be wished this supposed species of scurvy had not been denominated of this distemper, and the more so, as he apprehends that in the countries most liable to the true scurvy, an acid is rarely to be blamed. He thinks, that if the acrimony of the fluids is great and sudden, a fever or flux will ensue; but if the accumulation is so slow, that the body grows habituated to the putrefaction, a scurvy prevails; this is the case in long voyages, occasioned by corrupted air and provisions, on board unventilated ships, in marshy countries from similar causes, and in a lesser degree in all northerly climates in most situations, from a want of due perspiration of what is putrid, and especially with the use of salted meats.

The scurvy, according to Sydenham, is known by a spontaneous weariness, a heaviness of the body, difficulty of breathing especially after motion, rottenness of the gums, a stinking breath, frequent bleeding of the nose, difficulty of walking, sometimes a swelling and sometimes a falling away of the legs, in which there are always livid, plumbeous, yellow, or violet-coloured spots, and the colour of the face is generally of a pale tawney.

Boerhaave observes, that the first state of this disease begins with unusual laziness, spontaneous weariness; the patient loves to be in a sitting or lying posture; there is a pain in all the muscles as if he was over-tired, especially in the legs and loins;

when he awakens in the morning, all his joints and muscles seem to be tired and bruised. In the second state, the gums swell, grow painful, hot, and itching, and bleed upon the least pressure: the roots of the teeth become bare and loose; he feels pains in all the external and internal parts of the body imitating distempers proper to the various parts. In the third state, the gums at length grow putrid, with a cadaverous smell; when they are inflamed, blood distils from them, and a gangrene ensues; the loose teeth by degrees grow yellow, black, and rotten; the sublingual veins become varicose and like rings; there are often fatal hæmorrhages, which break out from the external skin, without any appearance of a wound, from the lips, gums, mouth, nose, lungs, stomach, liver, spleen, pancreas, intestines, womb, kidneys, &c. Obstinate ulcers arise, which no application will cure, and are apt to turn to a gangrene; they break out in all parts of the body, but especially the legs, and are attended with a stench; there is a kind of itch and dry scabs, with a dry and mild leprosy; the blood drawn from a vein is black and grumous, thick, and yet wants its due consistence in the fibrous part; the serum is salt, sharp, and abounding with a yellowish green mucus on the surface: there are gnawing rending pains, quickly shifting from place to place, which grow more violent in the night, affecting all the joints, bones, and viscera. In the fourth state there are fevers of various kinds, which bring on an atrophy; sometimes diarrhæas, dysenteries, or violent strangueries; as also faintings and mortal anxieties, a dropsy consumption, convulsions, trembling, a palsy, contractions, black spots, voiding of blood upwards and downwards, a putrefaction and consumption of the liver, spleen, pancreas, mesentery: and now the contagion spreads very thick.

From this account of the disease it appears, continues the last-mentioned author, that one part of the blood is faulty in being too thick, and the other in being too thin, with a salt alkaline, or acid acrimony; wherefore, to discover which of the three predominates, requires the utmost attention, and the most accurate enquiry: for, in the cure of this disease, that which is thick is to be attenuated, that which is stagnant rendered moveable, and that which is coagulated is to be made fluid;

It ought to be laid down, says Hoffman, as a general rule, that the scurvy, the most virulent of all chronical distempers, is not to be treated with drastic, but with the most mild and simple medicines: likewise the patient should change the air in which the disease is formed, and remove from unhealthy places, where the air is impure, vapid, and deprived of its due elasticity, cloudy, or impregnated with noxious exhalations, to places more salutary, and where the air is more pure. If his circumstances will not admit of travelling to Italy or France for a purer air, he should burn juniper-wood in his chimney, or throw amber on live coals. The patient should also use exercise, not indulging himself in much sleep, be temperate in his diet, and feed upon aliment of easy digestion. Our author ventures to affirm, that mineral waters are a universal remedy for the scurvy; but the cure is still more certain, if an accurate regimen be observed, and the waters assisted by the repeated exhibition of proper antiscorbutic and balsamic medicines. When these cannot be had, pure light fountain-water, wherein hot iron has been extinguished, may be substituted in their room. Besides mineral waters, nothing is more effectual in correcting a scorbutic acrimony than a milk-diet, or whey, or whey impregnated with the juices of antiscorbutic herbs, as scurvy-grass and water-creffes. Scurvy-grass and all the species of garden and water-creffes, horse-radish, the roots of wild-radish, and mustard are justly looked upon as antiscorbutics, for they induce a surprising change both in the disordered fluids and solids. To these may be added the roots of gentian and succory, the leaves of scordium, carduus benedictus, wormwood, the lesser centaury, water-trefoil, or bucks-beans. Balsamics and corroboratives, as juniper-berries, the tops of fir and pine-trees, winters-bark, cortex elutheriæ, and the peruvian-bark: the gums ammoniac, sagapenum, and galbanum; and the woods of saffras, guaiacum, and aloes. Medicines which allay the pains and spasms, are the fat of animals, cream, oil of sweet almonds, sperma ceti, castor, assa foetida, extract of yarrow and camomile, diascordium, saffron, earth-worms, elk-hoof, &c. As to evacuations, bleeding should be used with the greatest caution; and none but the gentlest purges should be used, such as senna, rhubarb, or manna; also pills made after the manner of

Becher, with depurated aloes, extract of rhubarb, bitter herbs, and temperate balsamic ingredients. The diuretics should not be stronger than the decoction of the roots of parsley, celeri, fennel, and asparagus. The safest diaphoretics are dulcified spirit of nitre, flowers of sulphur, æthiops mineral, infusions in the manner of tea of Paul's betony, carduus benedictus, scordium, and elder-flowers, diaphoretic antimony, calcined and uncalcined hartshorn, amber, native cinnabar, cinnabar of antimony, and compound powder of crab's claws: these things are adapted to a cold scurvy. But in the hot or alkaline, scurvy-grass is too hot to be administered alone; wherefore it should be corrected with acids, such as wood-forrel, the juices of citrons, oranges, barberries, and pomegranates; this should be accompanied with milk-meats, almond-emulsions, barley-broths, water-gruel, chicken-broths, with endive, lettuce, forrel, and creffes, at intervals. When the scurvy proceeds from moriatic salts, which happens to those who live on smoked or high-salted fish or flesh, then whey, copiously drank, produces good effects; as also citrons, china-oranges, and ripe fruits; whereas spirituous and volatile antiscorbutics are generally detrimental. Heister says, that when there is a continual salt taste in the mouth, lime-water, drank morning and evening, is a high specific. The late bishop of Cloyne says, that if he may trust what trials he has been able to make, tar-water is good in the several sorts of scurvy, whether alkaline, acid, or moriatic; and that he believes it to be the only medicine that cures them all, without doing hurt in any. See the article TAR.

In a high degree of the scurvy, mercurial salivation is looked upon by many as the only cure; which by the vehement shock it gives the whole frame, and the sensible secretion it produces, may be thought to be more adequate to such an effect; but the disorder occasioned by that violent process, it is to be feared, may never be got over. See SALIVATION.

SCURVY-GRASS, *cochlearia*, in botany. See the article COCHLEARIA.

SCUTAGE, was antiently a tax imposed on such as held lands, &c. by knight's service, towards furnishing the king's army: hence scutagio habendo was a writ that lay for the king, or other lord, against tenants holding by knight's service, to serve in person, or send a sufficient

cient man in their room, or pay a certain sum, &c.

SCUTARET, or **SCUTARI**, a castle and seraglio on the east side of the Bosphorus, opposite to Constantinople, about a mile from it.

SCUTARI, a city of european Turkey, in the province of Albania, situated in east longit. 20° , and north lat. $42^{\circ} 30'$.

SCUTCHEON. See **ESCUTCHEON**.

SCUTELLARIA, in botany, a genus of the didynamia-gymnospermia class of plants, the corolla whereof consists of a single ringent petal; the tube is very short, and reflected backwards; the faux is long and compressed; the upper lip is concave and trifid, and the middle lacinula concave and emarginated; there is no pericarpium; the mouth of the calyx is originally open, but after the flower is fallen it becomes shut, with an operculum; the seeds are roundish, and four in number. This genus comprehends the calista of Tournefort.

This plant is recommended as good in tertian agues.

SCUTIFORME os, in anatomy, the chief bone of the knee, called also patella, mola, &c. See the article **PATELLA**.

SCUTIFORMIS CARTILAGO, in anatomy, one of the cartilages of the larynx, the broadest and biggest of them all, called also thyroides. See the article **LARYNX**. This cartilage is of a quadrangular figure, and stands in the anterior part, where the pomum Adami makes its prominence, whence it is sometimes called the anterior cartilage. It is gibbous withoutside, and hollow within; sometimes double, chiefly in women, in whom it does not advance so far forward as in men.

SCUTTLES, in a ship, square holes cut in the deck, big enough to let in the body of a man, serving to let people down into any room below upon occasion, or from one deck to another. They are generally before the main-mast, before the knight in the forecabin; in the gun-room, to go down to the stern sheets; in the round-house, to go down into the captain's cabin, when forced by the enemy in a fight aloft. There are also some smaller scuttles, which have gratings over them: and all of them have covers, that people may not fall down through them in the night.

Scuttle is also name given to those little windows and long holes which are cut out in cabins, to let in light.

SCYTALA, in mechanics, a term used

by some writers, for a kind of radius, or spoke, standing out from the axis of a machine, as a handle or lever to turn it round and work it by.

SCYTALA LACONICA, a stratagem or device of the Lacedemonians, for the secret writing of letters to their correspondents, so that if they should chance to be intercepted, no body might be able to read them. To this end they had two wooden rollers or cylinders, perfectly alike and equal, one whereof was kept in the city, and another by the person to whom the letter was directed. For the letter, a skin of a very thin parchment was wrapped round the roller, and thereon was the matter written; which done, it was taken off, and sent away to the party, who, upon putting it in the same manner upon his roller, found the lines and words in the very same disposition as when they were first written.

SCYTHIA. The northern parts of Europe and Asia were antiently so called, which afterwards obtained the name of Tartary.

SEA, mare, is frequently used for that vast tract of water encompassing the whole earth; but is more properly a part or division of these waters, and is better defined a lesser assemblage of water, which lieth before and washeth the coasts of some particular countries, from whence it is generally denominated, as the Irish sea, the Mediterranean sea, the Arabian sea, &c.

What proportion the superficies of the sea bears to that of the land is not precisely known, though it is said to be somewhat more than two thirds. As the waters of the earth must necessarily rise to the surface thereof, as being specifically lighter than the earth, it was necessary there should be large cavities therein for receptacles to contain them; otherwise they would have overspread all the superficies of the earth, and so have rendered it utterly uninhabitable for terrestrial animals; for the center of the earth being the common center of gravity, and the nature of fluids being such, that they equally yield to equal powers; and the power of attraction being every where equal at equal distances from the center, it follows, that the superficial parts of the water will every where conform themselves to an equidistant situation from the center, and consequently will form the surface of a sphere, so far as they extend. Hence, that the sea seems higher than the

earth

earth or land, results from the fallacy of vision, whereby all objects, and the parts of land as well as sea, the farther they are off from us, the higher they appear; the reason of all which is plain from optics: for it is well known, that the denser any medium is, through which we behold objects, the greater is the refraction; or the more their images appear above the horizontal level; also the greater quantity of the medium the rays pass through, the more will they be bent from their first direction; on both these accounts the appearances of things remote, and on the sea, will be somewhat above the horizon, and the more so, as they are the more remote. See the articles GRAVITY, FLUID, EARTH, REFRACTION, &c. With regard to the depth or profundity of the sea, Varenius affirms, that it is in some places unfathomable, and in other places very various, being in certain places $2\frac{1}{2}$, $3\frac{1}{2}$, $4\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $4\frac{1}{2}$ english miles, in other places deeper, and much less in bays than in oceans. In general, the depths of the sea bear a great analogy to the height of mountains on the land, so far as is hitherto discovered. See the article MOUNTAIN.

M. Daffie has been at great pains to prove that the sea has a general motion, independent of winds and tides, and of more consequence in navigation than is generally supposed. He affirms, that this motion is from east to west inclining towards the north, when the sun has passed the equinoctial northward, and that during the time the sun is in the northern signs; but the contrary way after the sun has passed the said equinoctial southward; adding, that when this general motion is changed, the diurnal flux is changed also; whence it happens that in several places the tides come in, during one part of the year, and go out during the other, as on the coasts of Norway, in the Indies at Goa, Conchinchina, &c. where, while the sun is in the summer signs, the sea runs to the shore; and when in the winter signs, runs from it. On the most southern coasts of Tonquin and China, for the six summer months, the diurnal course runs from the north with the ocean; but the sun having repassed the line toward the south, the course declines also southward.

There are two principal reasons why the sea doth not increase by means of rivers, &c. falling every where into it. The first is, because waters return from the

sea by subterranean cavities and aqueducts, through various parts of the earth. Secondly, because the quantity of vapours raised from the sea, and falling on the land, only cause a circulation, but no increase of water. It hath been found by calculation, that in a summer's day there may be raised in vapours, from the Mediterranean sea 52800000000 tuns of water; and yet this sea receiveth not, from all its nine great rivers, above 1827000000 tuns per day, which is but a third part of what is exhausted in vapours.

The ascent of the sea-water, for the formation of springs, by a subterranean circulation of its water to their sources, has been a great objection with many, against the system of their being formed of the sea; but Dr. Plot has observed, that there are many ways by which the water may ascend above its own level: 1. By the means of subterranean heats. 2. By filtration. 3. By the unequal height of several seas. 4. By the distance of the center of magnitude from the center of gravity in the terraqueous globe: the superficies of the Pacific sea is said to be farther from the center of gravity than the top of the highest hill on the adverse part of the globe. And 5. By the help of storms. The sea-water actually ascends above its own level, coming into wells, whose bottoms lie higher than the surface of the sea at high-water mark.

With regard to the saltness of the sea-water, it is very rationally judged to arise from great multitudes both of mines and mountains of salt, dispersed here and there in the depths of the sea. The salt being continually diluted and dissolved by the water, the sea becomes impregnated with its particles throughout; and for this reason the saltness of the sea can never be diminished. Dr. Halley supposes that it is probable the greatest part of the sea-salt, and of all salt-lakes, as the Caspian sea, the Dead-sea, the lake of Mexico, and the Titicaca in Peru, is derived from the water of the rivers which they receive; and since this sort of lakes has no exit or discharge, but by the exhalation of vapours; and also since these vapours are entirely fresh, or devoid of such particles, it is certain the saltness of the sea and such lakes must, from time to time increase, and therefore the saltness at this time is greater than at any time heretofore. He further adds, that if, by experiments made in different ages, we could

could find the different quantity of salt, which the same quantity of water (taken up in the same place, and in all other the same circumstances) would afford, it would be easy from thence, by rules of proportion, to find the age of the world very nearly, or the time wherein it has been acquiring its present saltiness.

With regard to the use of this salt property of sea-water, it is observed that the saltiness of the sea preserves its waters pure and sweet, which otherwise would corrupt and stink like a filthy lake, and consequently that none of myriads of creatures that now live therein, could then have a being. From thence also the sea-water becomes much heavier, and therefore ships of greater size and quantity may be used thereon. Salt water also doth not freeze so soon as fresh water, whence the seas are more free for navigation. We have lately had published a dissertation, by Dr. Ruffel, concerning the medical uses of sea-water, in diseases of the glands, &c. wherein the author premises some observations upon the nature of sea-water, considered as impregnated with particles of all the bodies it passes over, such as submarine plants, fish, salts, minerals, &c. and saturated with their several effluvia, to enrich it, and keep it from putrefaction; hence this fluid is supposed to contract a soapiness, and the whole collection being pervaded by the sulphureous steams passing through it, to constitute what we call sea-water, the confessed distinguishing characteristics of which are saltiness, bitterness, nitrosity, and unctuousity: whence the author concludes, that it may be justly expected to contribute signally to the improvement of physic. The cases in which our author informs us we are to expect advantage from sea-water, are, 1. In all recent obstructions of the glands of the intestines and mesentery. 2. All recent obstructions of the pulmonary glands, and those of the viscera, which frequently produce consumptions. 3. All recent glandular swellings of the neck, or other parts. 4. Recent tumours of the joints, if they are not suppurated, or become scirrhus, or cancerous, and have not carious bones for their cause. 5. Recent defluxions upon the glands of the eye-lids. 6. All descensions of the skin, from an erysipelas, to a lepra. 7. Diseases of the glands of the nose, with their usual companion a thickness of the lip. 8. Obstructions of the kidneys, where there is

no inflammation, and the stone not large.

9. In recent obstructions of the liver this method will be proper, where it prevents constipations of the belly, and assists other medicines directed in icteric cases. The same remedy is said to be of signal service in the bronchocele; and is likewise recommended for the prevention of those bilious colics that so frequently affect our mariners.

To make sea-water fresh is a thing long and much wanted, for the advantage of navigation and commerce; a method for doing which has been long ago invented by Mr. Hauton, and the secret published in the *Philos. Transact.* It is performed by precipitating the water with oil of tartar, and then distilling it. But Mr. Appleby's process, which was referred by the lords of the admiralty to the college of physicians, and communicated to the royal society, with some experiments therewith, on Feb. 8, 1753, appears to be more successful, and is performed thus: into twenty gallons of sea-water put six ounces of a fixed alkali, prepared with quick-lime as strong as lapis infernalis, and six ounces of bones, calcined to a whiteness, and finely powdered; with a slow fire, draw off, in a common still, fifteen gallons. Mr. Appleby conceives that the alkali here employed is the best adapted to prevent the bituminous matter in sea-water from rising by heat in distillation.

In the year 1755, a method of procuring any quantity of fresh water at sea was published by Dr. Butler; together with a method also of preserving fresh water entirely pure, sweet, and wholesome, during the longest voyage, and in the warmest climates. The method more expressly recommended by the doctor for making sea-water fresh, is to put a measured wine-quart of the strongest soap leys to fifteen gallons of sea-water, which being distilled, he assures us, will generally yield twelve gallons of fresh water. The above quantity of soap leys, we are told, will bear a repetition of the same quantity of water four or five times.

This method of Dr. Butler was tried, by order of the lords of the admiralty, at the same time with Mr. Appleby's: but the latter, being found to be performed with a less quantity of fuel, was preferred.

In order to keep fresh water sweet, Dr. Butler directs to take of fine, clear, white pearl ashes, a quarter of a pound avoirdupois.

dupois, and put into one hundred gallons of fresh water; observing this proportion to a greater or less quantity, and stop up your cask as usual, till you have occasion to broach it.

For the ebbing and flowing of the sea, see the article **TIDES**.

For the sea-army, sea-astrolabe, sea-biscket, sea-chart, sea-compass, &c. see the articles **ARMY**, **ASTROLABE**, **BISKET**, **CHART**, &c.

SEA-MEN, such as are reserved to serve the king, or other persons, at sea, who may not depart without license, &c. Seamen fighting, quarreling, or making any disturbance, may be punished by the commissioners of the navy, with fine and imprisonment. Registered sea-men are exempted from serving in any parish-office, &c. and are allowed bounty money besides their pay. By the law of merchants, the sea-men of a vessel are accountable to the master or commander, and the master to the owners, and the owners to the merchants, for damage sustained either by negligence or otherwise. Where a seaman is hired for a voyage, and he deserts it before it is ended, he shall lose his wages; and in case a ship be lost by a tempest, or in a storm, the sea-men lose their wages, as well as the owners their freight. See **NAVAL AFFAIRS**.

SEAFORD, a port-town of Sussex, situated on the english channel, seven miles south of Lewes.

It sends two members to parliament.

SEAL, *sigillum*, a puncheon, or piece of metal, or other matter, usually either round or oval, whereon are engraven the arms, device, &c. of some prince, state, community, magistrate or private person, often with a legend or subscription, the impression whereof in wax, serves to make acts, instruments, &c. authentic. Before the time of William the conqueror, the makers of all deeds only subscribed their names, adding the sign of the cross, and a great number of witnesses; but that monarch and the nobility used seals with their arms on them, which example was afterwards followed by others. The colour of the wax where-with this king's grants were sealed was usually green, to signify that the act continued fresh for ever, and of force. A seal is absolutely necessary in respect of deeds, because the sealing of them makes persons parties thereto, and without being sealed, they are void in law.

It is held, that if a seal be broken of it will render the deed void, and thence several are bound in a bond, the pulling off the seal of one vacates it as to all the rest.

The king's great seal is that whereby all patents, commissions, warrants, &c. coming from the king are sealed. The keeping hereof is in the hands of the lord high chancellor, who is hence denominated lord keeper. Indeed there is some difference between the lord chancellor and lord keeper, not in office, but in the manner of creation, the latter being made by the delivery of the great seal to him by the king, but the former having a patent. The king's privy seal is a seal that is usually first set to grants that are to pass the great seal. See **KEEPER**.

SEAL is also used for the wax or lead, and the impression thereon, affixed to the thing sealed.

SEALER, an officer in chancery appointed by the lord chancellor or keeper of the great seal, to seal the writs and instruments there made in his presence.

SEALING, in architecture, the fixing a piece of wood or iron in a wall with plaster, mortar, cement, lead, and other solid binding. For staples, hinges and joints, plaster is very proper.

SEALING-WAX. See the article **WAX**.

SEAM or **SEME** of corn, is a measure of eight bushels.

SEAM of glass, the quantity of 120 pounds or 24 stones, each five pounds weight. The seam of wood is an horse load.

SEAMS of a ship, are places where her planks meet and join together. There is also a kind of peculiar seam in the fowling sails, which they call monk-seam; the other seam of a sail is the round seam, so called from its being round like the common seams.

SEARCE. See the article **SIEVE**.

SEARCHER. See the article **ALNAGE**. Searcher is also an officer of the custom whose business is to search and examine all ships outward bound, to see whether they have any prohibited or unaccustomed goods on board.

SEAR-CLOTH, or **CERE-CLOTH**, in surgery, a form of external remedy somewhat harder than an unguent, yet softer than an emplaster, though it is frequently used both for the one and the other. The sear-cloth is always supposed to be wax in its composition, which distinguishes it and even denominates it. In effect

when a liniment or unguent has wax enough in it, it does not differ from a fear-cloth. Sear-cloths are a kind of substitutes to friction, and are sometimes used for other purposes; the best are compounded of resolvent drugs, as saffron, myrrh, and aloes, incorporated with wax and gums, as galbanum, gum ammoniac, and sagapenum, the whole tempered with wine.

SEASE. See the article **SEIZE**.

SEASIN, or **SEASING**, in a ship, the name of a rope by which the boat rides by the ship's side when in harbour, &c.

SEASONS, in cosmography, certain portions or quarters of the year, distinguished by the signs which the earth then enters, or by the meridian altitudes of the sun, consequent on which are different temperatures of the air, different works in tillage, &c. The year is divided into four seasons, spring, summer, autumn, and winter. The beginnings and endings of each whereof, see under its proper article, **SPRING**, &c.

How the course of the earth's revolution about the sun constitutes all the variety of the seasons, may be seen under the article **EARTH**.

SEASONING of timber. See **TIMBER**.

SEAT, in astronomy. See **SCHEAT**.

SEAT, in the manege, the posture or situation of the horseman upon the saddle.

SEBASTIAN ST. a port-town of Spain, in the province of Biscay, and territory of Guipuscoa, situated in west long. $1^{\circ} 50'$, north lat. $43^{\circ} 35'$.

SEBESTEN, or **CORDIA**, in botany. See the article **CORDIA**.

SEBUM, **SUET**, in anatomy. See **SUET**.

SECALE, or **SECALINA**, **RYE**, in botany, a genus of the triandria-digynia class of plants, the corolla whereof consists of two valves; the exterior valve is rigid, ventricose, acuminate and compressed, its lower edge is ciliated, and it terminates in a long arista; the interior valve is lanceolated and plane; the nectaria are two, ovated and erect; the corolla serves the office of a pericarpium, inclosing the seed, and, at a proper time, opening and dropping it out; the seed is single, oblong, and almost cylindric. See **RYE**.

SECANT, in geometry, is a line that cuts another, or divides it into two parts. See the article **LINE**.

Thus the line **AM** (plate **CCXLIII**. fig. 7. n^o 1.) is a secant to the circle **AED**, &c. as it cuts it in **B**.

It is demonstrated by geometers, 1. That if several secants **MA**, **MN**, **ME**, &c. be drawn from the same point **M**, that passing through the center **MA** is the greatest, and the rest are all so much the less as they are more remote from the center. On the contrary, the portions thereof without the circle **MD**, **MO**, **MB**, are so much the greater as they are farther from the center. 2. That if two secants, **MA** and **ME** be drawn from the same point **M**, the secant **MA** will be to **ME**, as **MD** to **MB**. See the article **TANGENT**.

In trigonometry, the secant denotes a right line drawn from the center of a circle, which cutting the circumference, proceeds till it meets with a tangent to the same circle: thus the line **FC** (*ibid.* n^o 2) drawn from the center **C** till it meet the tangent **EF**, is called a secant; and particularly the secant of the arch **AE** to which **EF** is a tangent. The secant of the arch **AH**, which is the complement of the former arch to a quadrant, is called the co-secant, or secant of the complement. See the articles **CIRCLE**, **COMPLEMENT**, &c.

For the properties and use of the secant, see the articles **TRIGONOMETRY**, **NAVIGATION**, **SURVEYING**, &c.

For the line of secants on the sector, see the article **SECTOR**.

SECOMIÆ, in natural history, the name of a genus of fossils, of the class of the septariæ, the characters of which are; that they are bodies of a dusky hue, divided by septa, or partitions of a sparry matter, into several more or less regular portions, of a moderately firm texture, not giving fire with steel, but fermenting with acid menstrua, and easily calcining. See **SEPTARIÆ**.

The septariæ of this genus are, of all others, the most common, and are what have been known by the little expressive, or mistaken names of the waxen vein, or ludus helmontii. We have many species of these bodies common among us. Of the whitish or brownish kinds we have thirteen; of the yellowish five, and of the ferruginous ones four.

SECOND, in geometry, chronology, &c. the sixtieth part of a prime or minute, whether of a degree, or of an hour: it is denoted by two small accents, thus ($''$). See **DEGREE**, **HOURL**, **MINUTE**, &c.

SECOND, in music, one of the musical intervals; being only the difference between

tween any sound, and the next nearest sound, whether above or below it. See the article INTERVAL.

As in the compass of a tone some reckon nine sensible sounds, and others ten, which form the intervals called commas; so there are eight kinds of seconds according to the former opinion, and nine according to the latter. However, in practice, they usually distinguish only four sorts. 1. That called a diminished second, containing four commas; being the difference, for instance, of a natural *ut*, and an *ut* sharp. 2. That called a second minor, or imperfect second, containing five commas, *viz.* from *mi* to *fa*; or from *la* to *B mol*; or from *fa* sharp to *sol*. 3. A major second, called by the Italians a perfect second, containing nine commas. 4. A redundant second, composed of a whole tone, and a minor semitone.

SECOND deliverance, secunda deliberatione, a judicial writ that lies after nonsuit of the plaintiff in replevin, and a returno habendo of the cattle replevied, adjudged to him that distrained them; commanding the sheriff to replevy the same cattle again, upon security given by the plaintiff in the replevin for a redelivery of them, if the distress be justified. It is a second writ of replevin, &c.

SECONDARY, in general, something that acts as second, or in subordination to another.

• Secondary circles of the sphere are circles passing through the poles of some great circle: thus the meridians and hour-circles are secondaries to the equinoctial. There are also secondaries passing through the poles of the ecliptic, by means of which all stars are referred to the ecliptic. See the articles ECLIPTIC, LONGITUDE, SPHERE, &c.

SECRETARY, an officer who by his master's orders writes letters, dispatches, and other instruments, which he renders authentic by his signet. Of these there are several kinds; as, 1. Secretaries of state, who are officers that have under their management and direction the most important affairs of the kingdom, and are obliged constantly to attend on the king: they receive and dispatch whatever comes to their hands, either from the crown, the church, the army, private grants, pardons, dispensations, &c. as likewise petitions to the sovereign; which when read, are returned to them; all which they dispatch according to the

king's direction. They have authority to commit persons for treason, and other offences against the state, as conservators of the peace at common law, or as justices of the peace throughout the kingdom. They are members of the privy-council, which is seldom or never held without one of them being present; and as to the business and correspondence in all parts of this kingdom, it is managed by either of the secretaries without any distinction; but with respect to foreign affairs, the business is divided into two provinces, or departments, the southern and the northern, comprehending all the kingdoms and states that have any intercourse with Great Britain; each secretary receiving all letters and addresses from, and making all dispatches to, the several princes and states comprehended in his province. Ireland and the plantations are under the direction of the elder secretary, who has the southern province, which also comprehends France, Italy, Switzerland, Spain, Portugal, and Turkey: the northern province includes the Low Countries, Germany, Denmark, Sweden, Poland, and Muscovy. Each of the secretaries have an apartment in all the royal houses, both for their own accommodation and their officers; they have also a table at the king's charge, or else board-wages. The two secretaries of state have each two under secretaries, and one chief clerk, with an uncertain number of other clerks and translators, all wholly depending on them. To the secretaries of state belong the custody of that seal properly called the signet, and the direction of two other offices, one called the paper-office, and the other the signet-office.

2. Secretary of an embassy, a person attending an ambassador for writing dispatches relating to the negotiation. There is a great difference between the secretary of an embassy, and the ambassador's secretary; the last being a domestic or menial of the ambassador, and the first, a servant or minister of the prince.

3. The secretary of war, an officer of the war-office, who has two chief clerks under him, the last of which is the secretary's messenger. There are also secretaries in most of the other offices.

SECRETION, *secretio*, in the animal oecconomy, the separation of some fluid mixed with the blood by means of the glands. See the article GLAND.

In the bodies of animals we observe a great

great number of juices of different natures, *viz.* the blood, lymph, saliva, stomach-liquor, intestinal juices, pancreatic juice, bile, urine, &c. and the blood is the general source of all. See the articles BLOOD, LYMPH, SALIVA, &c.

The manner wherein this secretion is performed, has been greatly enquired into for a century past; but as the exceeding minuteness of the organs whereby secretion is effected prevents any regular search, various authors have imagined various methods for explaining it.

The antient physicians contented themselves only with asserting certain particular virtues or faculties inherent in the viscera, whereby they were determined to separate one liquor rather than another. Some of the moderns, full of the effects they have observed from fermentations, maintain, that there are ferments in the several parts, by the aid whereof certain kinds of particles mixed in the blood are separated therefrom, after the same manner as we see in must or new wine, from which, while fermenting, certain parts are detached in form of froth. Others consider the glands as kinds of sieves, whose holes having different figures, will only let pass certain particles or molecules, whose figures resemble those of the holes; but the many inconveniencies which both these suppositions have to grapple withal, made some naturalists have recourse to what is called imbibition: these maintain, that besides the different diameters of the pores, it is required that the several parts be already imbued or moistened with a liquor like to that they are to filter.

This opinion Winslow adopted; and not satisfied with conjectural principles, applied himself to experiments, in order to investigate the manner wherein secretion is performed, and lays it down thus. It is well known that a piece of brown paper, which is only an assemblage of small fibres compacted close to each other, having once imbibed oil or water, will never let any other liquor pass through it but of the same kind with what it is impregnated with; all others it stops. Now in the secretory ducts of the glands we find a parallel structure, an assemblage of fine threads or filaments bound close together, much as in brown paper, &c. only differently disposed; this plexus then having once imbibed a certain juice, will not let pass any of

the liquors which arrive at the orifices of these ducts, but that which it had first imbibed: the cause of this phenomenon is referred to the attraction of cohesion, which is found stronger between the homogeneous than the heterogeneous parts of the same fluid. As the blood then is not a homogeneous liquor, but a compound of an infinity of different parts or molecules, some oily, others mucilaginous, aqueous, saline, subtle, gross, &c. in its motion along the arteries of the gland, it becomes divided into all the little ramifications thereof, by which means its velocity is exceedingly abated, and the molecules are obliged to go off, one by one, through the narrow passage of the artery into the vein, and of consequence to pass over the orifice of the secretory ducts of the glands, whose down is already tinged with a juice of a certain nature: such of the molecules, therefore, as are found of the same nature with the juice they meet withal at the entrance of the secretory duct, join themselves to them, and entering the ducts, are driven on by others that follow them, and are at length driven into the excretory duct. But how these parts should have first imbibed the particular juices necessary for their respective secretions, is the question. Mr. Winslow thinks it probable that they had been imbued with the juices they were to filtrate at the first formation of the animal, or at the time when the solid parts were framed.

Kiel accounts for secretion from the joint consideration of the different diameters of the vessels, the different velocity of the blood, the different angles the ducts make with the arteries, and the different attraction of the various parts under all these different circumstances. It is observed, that in this theory there is something arbitrary and conjectural; besides, that the reasoning is carried on to such a length, that in a thing, the principles whereof are so obscure, the parts or organs so imperfectly known, and the whole process carried on out of sight, the mind cannot safely acquiesce in it.

Hales makes it evident from experiments, that the animal secretions are not made with the full force of the arterial blood, but more gradually and sparingly, so as to be carried forward in those very fine vessels by an alternate pulsive force of the arterial fluid, and attractive power of the fine secerning vessels, assisted also by constant vibrations; for the animal

fluids and solids are in an incessant, mutually, vibrating state. In this manner, doubtless, the plentiful secretions are made into the stomach and guts, as also in the pancreas, mesenteric, salival, and other glands of the body; and thus also the perspiring matter is carried off, not by the more protrusive force of the arterial blood alone, but also by the warmth and mutual action of the fluids and solids. See PERSPIRATION, &c.

For the use, &c. of the animal secretions, see EXCRETION and EXCREMENT.

SECT, *secta*, a collective term, comprehending all such as follow the doctrines and opinions of some famous divine, philosopher, &c. See the articles HERESY and SCHISM.

The principal sects among the ancient philosophers were the epicureans, peripatetics, academics, stoics, pyrrhonists, &c. See the article EPICUREANS, &c. Among the moderns, the newtonians, cartesianians, &c. are the principal ones in Europe. See NEWTONIAN, &c.

And the calvinists, lutherans, papists, anabaptists, arians, socinians, arminians, &c. are the principal sects to be found among modern divines. See the article CALVINISTS, &c.

SECTA ad curiam, in law, a writ which lieth against him who refuseth to perform his suit to the county-court, or court-baron.

SECTA curie, in our old writers, suits and service done by the tenants at the court of their lord.

SECTA facienda per illam quæ habet anitiam partem, a writ to compel the heir that hath the elder's part among coheirs, to perform service for all the coparceners.

SECTA molendini, a writ lying where a man by usage, time out of mind, &c. has ground his corn at the mill of a certain person, and afterwards goes to another mill with his corn, thereby withdrawing his suit to the former. And this writ lies especially for the lord against his tenants, who hold of him to do suit at his mill.

SECTA regalis, a suit by which all persons were bound twice in a year to attend the sheriff's tourn, and was called regalis, because the sheriff's tourn was the king's leet; wherein the people were to be obliged by oath to bear true allegiance to the king, &c.

SECTA unica tantum facienda pro pluribus bareditatis, a writ that lies for an heir who is distrained by the lord to do more

suits than one, in respect of the land of divers heirs descended to him.

SECTINEUS, in anatomy, a small, flat, and pretty long muscle, broad at the upper part, and narrow at the lower; situated obliquely between the os pubis, and the upper part of the os femoris. It is commonly a single muscle, but is sometimes found double. It is fixed above by fleshy fibres to all the sharp ridge, or crista of the os pubis, and to a small part of the oblong notch, or depression on the fore side of the crista, in which the upper extremity of this muscle is lodged; from thence it runs down obliquely towards the little trochanter, under, and a little behind which, it is inserted obliquely by a flat tendon between the superior insertion of the vastus internus, and inferior insertion of the triceps secundus, with which it is united.

SECTION, in general, denotes a part of a divided thing, or the division itself. Such, particularly, are the subdivisions of a chapter; called also paragraphs and articles: the mark of a section is §.

SECTION, in geometry, denotes a side or surface appearing of a body or figure cut by another; or the place where lines, planes, &c. cut each other.

The common section of two planes is always a right line; being the line supposed to be drawn on one plane by the section of the other, or by its entrance into it.

SECTION of a building, in architecture, is the same with its profile; or a delineation of its heights and depths raised on a plane, as if the fabric was cut asunder to discover its inside.

Cæsarean SECTION. See the article CÆSAREAN SECTION.

Conic SECTIONS, in geometry. See the articles CONE and CONIC.

SECTOR, in geometry, is a part of a circle, comprehended between two radii and the arch; or it is a mixed triangle, formed by two radii and the arch of a circle. See the articles CIRCLE, ARCH, RADIUS, TRIANGLE, &c.

For the method of finding the area of a sector, as well as of a segment of a circle, see the article SEGMENT.

SECTOR is also a mathematical instrument, of great use in finding the proportion between quantities of the same kind, as between lines and lines, surfaces and surfaces, &c. for which reason the French call it the compass of proportion.

The great advantage of the sector above

com-

common scales, &c. is, that it is adapted to all radii, and all scales. For, by the line of chords, lines, tangents, &c. on the sector, we have lines of chords, lines, tangents, &c. adapted to any radius betwixt the length and breadth of the sector, when opened.

The sector is founded on the fourth proposition of the sixth book of Euclid, where it is demonstrated, that similar triangles have their homologous sides proportional; an idea of its foundation or theory may be conceived from what follows: let the lines AB, AC (plate CCXLIII. fig. 4.) represent the two legs of the sector, and AD, AE, two equal sections from the center. If now the points BC and DE be connected, the lines BC and DE will be parallel; therefore the triangles ADE, and ABC, will be similar, and consequently the sides AD, DE, AB, BC, proportional; that is, as AD : DE :: AB : BC; whence, if AD be the half, third, or fourth part of AB, DE will be a half, third, or fourth part of BC. Whence it follows, that if AD be the chord, sine, tangent, &c. of any number of degrees to the radius AB, DE will be the same to the radius BC.

Description of the SECTOR. This instrument consists of two equal legs, or rules of brass, &c. riveted together, but so as to move easily on the rivet; (*ibid.* fig. 1, 2.) on the faces of the instrument are placed several lines; the principal of which are the line of equal parts, line of chords, line of sines, line of tangents, line of secants, and line of polygons.

The line of equal parts, called also the line of lines, marked L, is a line divided into 100 equal parts, and, where the length of the leg will allow it, each of these is subdivided into halves and quarters. It is found on each leg, on the same side, and the divisions numbered 1, 2, 3, 4, 5, &c. to 10, which is near the extremity of each leg. Note, in practice, 1 represents either 1, 10, 100, 1000, 10000, &c. as occasion requires, in which case, 2, represents 2, 20, 200, 2000, 20000, &c. and so of the rest. The line of chords, marked C on each leg, is divided after the usual manner, and numbered 10, 20, 30, &c. to 60. The line of sines, denoted on each leg by the letter S, is a line of natural sines, numbered 10, 20, 30, &c. to 90. The line of tangents, denoted on each leg by the letter T, is a line of natural tangents,

numbered 10, 20, 30, &c. to 45. Besides which there is another little line of tangents on each leg, commencing at 45° , and extending to 75° , denoted by the letter t. Line of secants, denoted on each leg by the letter s, is a line of natural secants, numbered 10, 20, 30, &c. to 75, not commencing at the center of the instrument, but at some distance therefrom. The line of polygons, denoted by the letter P on each leg, is numbered 4, 5, 6, &c. to 12, which falls considerably short of the center of the instrument. See CHORD, SINE, &c.

Besides these lines, which are essential to the sector, there are others placed near the outward edges on both sides, and parallel thereto, which are in all respects the same as those on Gunter's scale, and used after the same manner. Such are the lines of artificial sines marked S, of artificial tangents marked T, and Gunter's line of numbers marked N; these lines do not extend to the end of the instrument. There are sometimes other lines placed, to fill the vacant spaces, as the lines of hours, latitudes, and inclination of meridians, which are used the same as on the common scales. See the articles GUNTER, SCALE, &c.

The lines found by the sector are of two kinds, lateral and parallel; the first are such as are found by the sides of the sector, as AB, AC (*ibid.* fig. 4.) the latter such as go across from one leg to the other, as DE, BC. Note, the lines are not placed in the same order on all sectors, but they may be easily found by the above directions.

Use of the line of equal parts on the SECTOR.

1. To divide a given line into any number of equal parts, suppose seven. Take the given line in your compasses, and setting one foot in a division of equal parts, that may be divided by seven, for example 70, whose seventh part is 10, open the sector till the other point fall exactly on 70, in the same line on the other leg. In this disposition, applying one point of the compasses to 10, in the same line, shut them till the other fall in 10, in the same line, on the other leg, and this opening will be the seventh part of the given line. Note, if the line to be divided be too long to be applied to the legs of the sector, divide only one half, or one fourth by 7, and the double or quadruple thereof will be the seventh part of the whole.

2. To measure the lines of the perimeter of

of a polygon, one of which contains a given number of equal parts. Take the given line in your compasses, and set it parallel, upon the line of equal parts, to the number on each leg expressing its length. The sector remaining thus, set off the length of each of the other lines parallel to the former, and the numbers each of them falls on, will express their lengths.

3. A right-line being given, and the number of parts it contains, suppose 120, to take from it a shorter line, containing any number of the same parts, suppose 25. Take the given line in your compasses, open the sector till the two feet fall on 120 on each leg; then will the distance between 25 on one leg, and the same number on the other, give the line required.

4. To multiply by the line of equal parts on the sector. Take the lateral distance from the center of the line to the given multiplicator; open the sector till you fit that lateral distance to the parallel of 1 and 1, or 10 and 10, and keep the sector in that disposition; then take in the compasses the parallel distance of the multiplicand, which distance, measured laterally on the same line, will give the product required. Thus, suppose it were required to find the product of 8, multiplied by 4: take the lateral distance from the center of the line to 4 in your compasses, *i. e.* place one foot of the compasses in the beginning of the divisions, and extend the other along the line to 4. Open the sector till you fit this lateral distance to the parallel of 1 and 1, or 10 and 10. Then take the parallel distance of 8, the multiplicand; *i. e.* extend the compasses from 8, in this line, on one leg, to 8 in the same line on the other, and that extent, measured laterally, will give the product required.

5. To divide by the line of equal parts on the sector. Extend the compasses laterally from the beginning of the line to 1, and open the sector till you fit that extent to the parallel of the divisor; then take the parallel distance of the dividend, which extent, measured in a lateral direction, will give the quotient required. Thus suppose it was required to divide 36 by 4; extend the compasses, laterally, the beginning of the line to 1, and fit to that extent the parallel of 4, the divisor; then extend the compasses parallel, from 36 on one leg, to 36 on the other, and

that extent, measured laterally, will give the quotient required.

6. To work any proportion by the sector. Take the second term lateral, and, opening the sector, apply that extent parallel in the first term, and stay the sector that position; then take the parallel distance of the third term, which extent, measured laterally, gives the fourth term required. This is so easy, from what has already been said, that it needs no example.

The use of the line of chords on the Sector.

1. To open the sector so as the lines of chords may make an angle of a given number of degrees, suppose 40. Take the distance from the joint to 40, on each leg, which distance is the line of chords; number of the degrees proposed, on the line of chords; open the sector till the distance from 60 to 60, on each leg, is equal to the given distance of 40; then will the two lines on the sector form an angle of 40 degrees, as was required.

2. The sector being opened, to find the degrees of its aperture. Take the distance from 60 to 60, and lay it off on the line of chords from the center; the number whereon it terminates will shew the degrees, &c. required.

3. To lay off any number of degrees upon the circumference of a circle. Open the sector till the distance between 60 and 60 be equal to the radius of the given circle; then take the parallel distance of the chord of the number of degrees on each leg of the sector, and lay it off on the circumference of the given circle. Hence any regular polygon may be easily inscribed in a given circle.

Use of the line of polygons on the Sector.

1. To inscribe a regular polygon in a given circle. Take the semi-diameter of the given circle in the compasses, and adjust it to the number 6, on the line of polygons, on each leg of the sector: then the sector remaining thus opened, take the distance of the two equal numbers expressing the number of sides the polygon is to have; *e. gr.* the distance from 5 to 5 for a pentagon, from 7 to 7 for a heptagon, &c. These distances carried about the circumference of the circle will divide it into so many equal parts.

2. To describe a regular polygon, *e. gr.* a pentagon, on a given right line. Take the length of the line in the compasses, and apply it to the extent of the number 5, 5, on the lines of polygons. Then the sector thus opened, upon the same line

take the extent, from 6 to 6; this will be the semi-diameter of the circle the polygon is to be inscribed in. If, then, with this distance, from the ends of the given line, you describe two arches of a circle, their intersection will be the center of the circle.

3. On a right line, to describe an isosceles triangle, having the angles at the base double that at the vertex. Open the sector, till the ends of the given line fall on 10 and 10 on each leg; then take the distance from 6 to 6. This will be the length of the two equal sides of the triangle.

Use of the lines of sines, tangents, and secants, on the SECTOR. By the several lines disposed on the sector, we have scales to several radiuses; so that having a length or radius given, not exceeding the length of the sector when opened, we find the chord, sine, &c. thereto, *e. gr.* Suppose the chord, sine, or tangent of 10 degrees, to a radius of 3 inches, required; make 3 inches the aperture, between 60 and 60, on the lines of chords of the two legs; then will the same extent reach from 45 to 45 on the line of tangents, and from 90 to 90 on the line of the sines on the other side; so that to whatever radius the line of chords is set, to the same are all the others set. In this disposition, therefore, if the aperture between 10 and 10, on the lines of chords, be taken with the compasses, it will give the chord of 10 degrees. If the aperture of 10 and 10 be in like manner taken on the lines of sines, it will be the sine of 10 degrees. Lastly, if the aperture of 10 and 10 be in like manner taken on the lines of tangents, it gives the tangent of 10 degrees.

If the chord, or tangent, of 70 degrees were required; for the chord, the aperture of half the arch, *viz.* 35, must be taken, as before; which distance, repeated twice, gives the chord of 70 degrees. To find the tangent of 70 degrees to the same radius, the small line of tangents must be used, the other only reaching to 45; making, therefore, 3 inches the aperture between 45 and 45 on the small line; the extent between 70 and 70 degrees on the same, will be the tangent of 70 degrees to 3 inches radius.

To find the secant of an arch, make the given radius the aperture between 0 and 0 on the line of secants: then will the aperture of 10 and 10, or 70 and 70, on

the said lines, give the tangent of 10°, or 70°.

If the converse of any of these things were required; that is, if the radius be required, to which a given line is the line, tangent, or secant, it is but making the given line, if a chord, the aperture on the line of chords, between 10 and 10, and then the sector will stand at the radius required; that is, the aperture between 60 and 60, on the said line, is the radius. If the given line were a sine, tangent, or secant, it is but making it the aperture of the given number of degrees; then will the distance of 90 and 90 on the sines, of 45 and 45 on the tangents, of 0 and 0 on the secants, be the radius.

Use of the SECTOR in trigonometry. 1. The base and perpendicular of a rectangled triangle being given, to find the hypotenuse. Suppose the base AC (*ibid.* fig. 6.) 40 miles, and the perpendicular AB 30; open the sector till the two lines of lines make a right angle: then for the base take 40 parts on the line of lines, on one leg; and for the perpendicular 30 on the same line, on the other leg: then the extent from 40 on the one, to 30 on the other, taken in the compasses, will be the length of the hypotenuse, which line will be found 50 miles.

2. The perpendicular AB of a right-angled triangle ABC being given, 30, and the angle BCA, 37°, to find the hypotenuse BC. Take the given side AB, and set it over, on each side, upon the sine of the given angle ACB; then the parallel distance of radius, or of 90 and 90, will be the hypotenuse BC; which will measure 50 on the line of sines.

3. The hypotenuse and base being given, to find the perpendicular. Open the sector, till the two lines of lines be at right angles; then lay off the given base on one of those lines from the center. Take the hypotenuse in your compasses, and, setting one foot in the point of the given base, let the other fall on the line of lines, on the other leg: the distance from the center to the point where the compasses fall, will be the length of the perpendicular.

4. The hypotenuse being given, and the angle ACB, to find the perpendicular. Make the given hypotenuse a parallel radius, *i. e.* make it the extent from 90

to go on the lines of fines; then will the parallel fine of the angle ACB be the length of the side AB.

5. The base and perpendicular AB given, to find the angle BCA. Lay off the base AC on both sides of the sector, from the center, and note its extent: then take the given perpendicular, and to it open the sector, in the terms of the base; the parallel radius will be the tangent of BCA.

6. In any right-lined triangle, two sides being given, with the included angle, to find the third side. Suppose the side AC (*ibid.* fig. 3.) 20, the side BC 30, and the included angle ACB 110° ; open the sector, till the two lines of lines make an angle equal to the given angle, *viz.* 110° . Lay off the given sides of the triangle from the center of the sector, on each of the lines of lines; the extent between their extremes is the length of the side AB sought.

7. The angles CAB and ACB given, and the side CB, to find the base AB. Take the given side CB, and turn it into the parallel fine of its opposite angle CAB; and the parallel fine of the angle ACB will be the length of the base AB.

8. The three angles of a triangle being given, to find the proportion of the sides. Take the lateral fines of the several angles, and measure them in the line of lines; the numbers answering thereto give the proportion of the sides.

9. The three sides being given, to find the angle ACB. Lay the sides AC, BC, along the line of lines, from the center; and set over the side AB in their terms; so is the sector opened, in these lines to the quantity of the angle ACB.

10. The hypotenuse AC (*ibid.* fig. 5.) of a right angled spherical triangle ABC given, *e. gr.* 43° , and the angle CAB 20° ; to find the side CB. The rule is: as radius is to the fine of the given hypotenuse 43° , so is the fine of the given angle 20° to the fine of the perpendicular CB. Take therefore 20° from the center, along the line of fines, in your compasses, and set the extent from 90 to 90, on the two legs; and the parallel fine of 43° , the given hypotenuse, will, when measured from the center of the line of fines, give $13^\circ 30'$, the side required.

11. The perpendicular BC, and the hypotenuse AC being given, to find the

base AB. As the fine complement the perpendicular BC is to radius, so the fine complement of the hypotenuse to the fine complement of the base. Make therefore, the radius a parallel fine of given perpendicular, then the parallel fine of the hypotenuse measured along the line of fines, will give the complement of the base required.

SECULAR, something that is temporal in which sense the word stands opposed to ecclesiastical; thus we say, secular power, secular jurisdiction, &c. Secular is more peculiarly used for a person who lives at liberty in the world, not shut up in a monastery, nor bound by vows, or subjected to the particular rules of any religious community; which sense it stands opposed to regular. The romish clergy is divided into secular and regular.

SECULAR GAMES, *ludi seculares*, in antiquity, solemn games held among the Romans once in an age. These games lasted three days and as many nights during which time sacrifices were performed, theatrical shews exhibited, combats, sports, &c. in the circus. The occasion of these games, according to Valerius Maximus, was to stop the progress of a plague. The first who to them celebrated at Rome was Valerius Publicola, the first consul created at the expulsion of the kings. The ceremonies to be observed therein were formerly prescribed in one of the books of the Sibyls. At the time of the celebration of the secular games, heralds were sent throughout all the empire, to intire that every one might come and see the solemnities which he never yet had seen nor was ever to see again. Authors are not agreed as to the number of years wherein these games returned, partly because the quantity of an age or seculum, among the antients, is not known and partly on other accounts; some have it that they were held every hundred years, and that the seculum or age was our century.

SECULAR POEM, *carmen seculare*, a poem sung or rehearsed at the secular games of which kind we have a very fine piece among the works of Horace, being a sapphic ode at the end of his epodes.

SECULARIZATION, the act of converting a regular person, place, or benefice into a secular one. Almost all cathedral churches were antiently regular, that is, the canons were to be

gious; but they have been since secularized. For the secularization of a regular church, there is required the authority of the pope, that of the prince, the bishop of the place, the patron, and even the consent of the people. Religious that want to be released from their vow, obtain briefs of secularization from the pope.

SECUNDA AQUA, among chemists, &c. aqua fortis that has been already used to dissolve some metal.

SECUNDA SUPER OPERATIONE PASTURÆ, in law, a writ that lies where admeasurement of pasture has been made, and he that first surcharged the common, does again surcharge it, notwithstanding the admeasurement.

SECONDARY, or **SECONDARY**. See the article **SECONDARY**.

SECUNDINES, *secundina*, after birth, in anatomy; the several coats or membranes wherein the fœtus is wrapped up in the mother's womb, as the chorion and amnios, with the placenta, &c. See the articles **CHORION**, **AMNIOS**, **PLACENTA**, **ALLANTOIS**, &c.

Hippocrates observes, that twins have always the same secundines. The secundines must never be left in the matrix, it being a foreign body which would destroy the mother. It is dangerous even to have the least piece of it left behind. See the article **DELIVERY**.

The human secundines are said to be of some use in medicine. Thus they are by some ordered to be applied warm as they come from the uterus to the face, in order to remove freckles. A water is also distilled from them in balneo mariæ for destroying spots or blemishes of the face: when dried and reduced to a powder, they are used internally against epilepsies, for accelerating the delivery of the fœtus, and allaying the pain of wounds. The dose of this powder is from half a scruple to two scruples.

Dr. Grew, in his anatomy of plants, applies the term secundine to the fourth and last coat or cover of seeds, by reason this performs nearly the same office in plants, that the membranes investing the fœtus do in animals.

SECURIDACA, in botany, a genus of the diadelphia-decandria class of plants, the corolla whereof is papilionaceous; the vexillum is roundish and very large; the alæ are obtuse, and the carina lunulated. The fruit is roundish, ending in a very large, oblong, obtuse, perpendicular

membrane, broadest above; the seed is single, and is invested with the whole pericarpium.

This plant taken inwardly is good for the stomach, and is an ingredient in antidotes used in a pessary with honey before coition, supposed to prevent conception.

SECURITATE PACIS, in law, a writ lying for a person who is threatened with danger from another against him that threatens; it issues out of the court of chancery, and is directed to the sheriff, &c.

SECURITATEM invenienti quod se non divertat ad partes externas sine licentia regis, is an antient writ which lay for the king against any of his subjects, to stay them from going out of the kingdom to foreign parts.

SECUTORES, in antiquity, a kind of gladiators among the Romans, who fought against the retiarii. The secutores were armed with a sword and a buckler, to keep off the net or noose of their antagonists, and they wore a cask on their head.

This was also a name given to such gladiators as took the place of those killed in the combat, or who fought the conqueror.

SEDAN, a town of Champain, in France, situated on the river Maes, in east long. 4° 45', north lat. 49° 46'.

SEDANTIA, **SEDATIVE MEDICINES**, in pharmacy; such medicines as are possessed of a power not only of composing, checking, and allaying the exorbitant and irregular motions of the solids and fluids, but also of alleviating and resolving the painful spasmodic strictures of the parts. As the effect of these medicines are very extensive, we may justly include in their number paregorics, which not only relax and gently sooth the rigid fibres, but also obtund the acrimony of the juices; anodynes, which alleviate the violence of racking pains; antispasmodics, which mitigate and remove the spasmodic strictures of the parts; antiepileptics, which check convulsive motions; hypnotics, which procure sleep; and narcotics, which induce a considerable stupor of the senses and torpor of all the motions of the body. See the articles **PAREGORICS**, **ANODYNE**, &c.

SE DEFENDENDO, in law, a plea used for him that is charged with the death of another, by alledging that he was under a necessity of doing what he did in his own defence; as that the other assaulted him in such a manner, that if he had not

done what he did, he must have been in hazard of his own life. But here the danger must appear so great, as to be inevitable. Any person in his just defence may kill others for the safety of his life; though if malice be coloured under a pretence of necessity, or one kill another before he is under a necessity of so doing, the same may be either murder or manslaughter by our law. See the articles MURDER and MANSLAUGHTER. Where two persons suddenly fall out, and one of them, being attacked, flies to the wall, or any unpassable place, as far as he can, in order to save his life, but being still pursued, kills the person that attacked him, this killing, as well as others in the like cases, is *se defendendo*. In *se defendendo*, though the affair justifies the killing to have been in his own defence, he is nevertheless obliged to sue out his pardon from the lord chancellor, which of course is granted him, but yet his goods and chattels become forfeited to the king. It is said, however, that upon the special matter found, he may be dismissed without any forfeiture, &c.

SEDIMENT, the settlement or dregs of any thing, or that gross heavy part of a fluid body which, upon resting, sinks to the bottom of the vessel.

SEDITION, among civilians, is used for the regular commotion of the people, or the assembly of a number of citizens without lawful authority, tending to disturb the peace and order of the society. This offence is of different kinds: some *seditions* more immediately threatening the supreme power, and the subversion of the present constitution of the state; others tending only towards the redress of private grievances. Among the Romans, therefore, it was variously punished, according as its end and tendency threatened greater mischief. In the punishment, the authors and ringleaders were justly distinguished from those, who with less wicked intention joined, and made part of the multitude. The same distinction holds in the law of England, and in that of Scotland. Some kinds of sedition in England amount to high-treason, and come within the stat. 25 Edw. III. as levying war against the king. And several seditions are mentioned in the Scotch acts of parliament as treasonable. The law of Scotland makes riotous and tumultuous assemblies a species of sedition. But the law there, as well as in England, is now chiefly regulated by the riot act,

made 1 Geo. I. only it is to be observed that the proper officers in Scotland, to make the proclamation thereby enacted are sheriffs, stewards, and bailies of regality, or their deputies; magistrates of royal burroughs, and all other inferior judges and magistrates; high and petty constables, or other officers of the peace in any county, stewartry, city or town. And in that part of the island, the punishment of the offence is death and confiscation of moveables: in England it is felony. See the article RIOT.

SEDR, or **SEDRE**, the high priest of the sect of Ali among the Persians. The *sedr* is appointed by the emperor of Persia, who usually confers the dignity on his nearest relation. The jurisdiction of the *sedr* extends over all effects destined for pious purposes, over all mosques, hospitals, colleges, sepulchres, and monasteries. He disposes of all ecclesiastical employments, and nominates all the superiors of religious houses. His decisions in matters of religion are received as so many infallible oracles; he judges of all criminal matters in his own house without appeal. His authority is balanced by that of the *mudschid*, or first theologian of the empire.

SEDUM, in botany, a genus of the decandria-pentagynia class of plants, the corolla whereof consists of five acuminate, lanceolated, plane, patent petals; the fruit consists of five erecto-patent, acuminate compressed capsules, emarginated towards the base, and opening longitudinally upwards and downwards; the seeds are numerous and small.

This genus comprehends the *sedum*, or house-leek, *orpine*, wall-pepper, and other species; all which agree in virtues with *orpine*. See **ORPINE**.

SEED, *semen*, in physiology, a substance prepared by nature, for the reproduction and conservation of the species, both in animals and plants. See **GENERATION**. The seed of animals, and particularly of mankind, is a whitish fluid secreted from the blood in the testes. See **TESTES**.

It is the thickest and most elaborated of all the humours in the human body; and by a chemical analysis, is found to consist almost entirely of oil and volatile salts blended with a little phlegm. The seminal liquor, however, such as emitted for use, is a mixture of the true semen with the liquors of the prostate, and other glands of the penis: all which, in the act of coition, are poured at the same

time into the common canal of the urethra, either from the glands where they are secreted, or the reservoirs where they are kept; and being there blended together, are injected into the uterus. See the articles CONCEPTION, GENERATION, FOETUS, &c.

The seed of vegetables is their last product, whereby the species are propagated; being frequently the fruit of a plant, but sometimes only a part included in the fruit.

Every seed consists of an embryo-plant, called *plantula seminalis*, with its covers. The embryo, which is the whole future plant in miniature, is called the germ or bud; and is rooted in the cotyledon or placenta, which makes its involucrem or cover. The cotyledon is always double; and in the middle, and common center of the two, is a point or speck, *viz.* the embryo plantule, which being acted on by the warmth of the sun and of the earth, begins to protrude its radicle, or root, downwards, and its bud upwards; and as the requisite heat continues, it draws nourishment by the root, and so continues to unfold itself and grow. See the article VEGETATION.

The two placenta, or cotyledons of a seed are, as it were, a case to the little embryo plant; covering it up, and sheltering it from injuries, and feeding it from their own proper substance; which the plantule receives, and draws to itself by an infinite number of little filaments, which it sends into the body of the placenta.

The cotyledons for the most part, abound with a balsam disposed in proper cells; and this seems to be oil brought to its greatest perfection, while it remains tumid, and lodged in these repositories: one part of the composition of this balsam is oily and tenacious, and serves to defend the embryo from any extraneous moisture; and, by its viscosity, to entangle and retain the fine, pure, volatile spirit, which is the ultimate production of the plant. This oil is never observed to enter into the vessels of the embryo, which are too fine to admit so thick a fluid. The spirit, however, being quickened by an active power, may possibly breathe a vital principle into the juices that nourish the embryo, and stamp upon it the character that distinguishes the family; after which every thing is changed into the proper nature of that particular plant.

Now, when the seed is committed to the earth, the placenta still adheres to the embryo for some time, and guards it from the access of noxious colds, &c. and even prepares and purifies the cruder juice the young plant is to receive from the earth, by straining it through its own body. This it continues to do, till the embryo-plant being a little enured to its new element, and its root tolerably fixed in the ground, and fit to absorb the juice thereof, it then perishes, and the plant may be said to be delivered; so that nature observes the same method in plants contained in fruits, as in animals in the mother's womb.

To explain this process of nature, let A, B, (plate CCXLIV. fig. 1.) be the two lobes, or cotyledons, of a bean slit open, and connected together by little white sprigs in O; in each lobe are seen the branches, *a, a, a*, of the seed-roots, *e, e*, which feed the little bud or sprout, *f*, with the pulp, or matter of the bean, till the earth root O C is capable of penetrating the earth, and extending its branches sufficiently to extract nourishment from the earth, both for itself and the plant it is to sustain. See the article EARTH.

Many sorts of seeds will continue good for several years, and retain their vegetative faculty; whereas others will not grow after they are one year old; this difference is in a great measure owing to their abounding more or less with oil; as also to the nature of the oil, and the texture of their outward covering. All seeds require some share of fresh air, to keep the germen in an healthy state; and where the air is absolutely excluded, the vegetative quality of the seeds will be soon lost. But seeds will be longest of all preserved in the earth, provided they are buried so deep as to be beyond the influence of the sun and showers; since they have been found to lie thus buried twenty or thirty years, and yet vegetate as well as new seeds. How the vegetative life is so long preserved, by burying them so deep in the ground, is very difficult to explain; but as the fact is very well known, it accounts for the production of plants out of earth taken from the bottom of vaults, houses, &c.

In the common method of sowing seeds, there are many kinds which require to be sown soon after they are ripe; and there are many others which lie in the
16 X_a ground

ground a year, sometimes two or three years, before the plant comes up: hence when seeds brought from distant countries are sown, the ground should not be disturbed, at least for two years, for fear of destroying the young plants.

As to the method of preserving seeds, the dry kinds are best kept in their pods or outer coverings; but the seeds of all soft fruits, as cucumbers, melons; &c. must be cleaned from the pulp and mucilage which surround them, otherwise the rotting of these parts will corrupt the seeds.

When seeds are gathered, it should always be done in dry weather; and then they should be hung up in bags in a dry room, so as not to deprive them of air.

Dispersatory-writers divide the seeds used in medicine into four classes: 1. The four greater hot seeds, *viz.* of aniseed, fennel, caraway, and cummin. 2. The four lesser hot seeds, *viz.* of bishop's-weed, stone-parsley, smallage, and wild carrot. 3. The four greater cold seeds, *viz.* cucumber, cucurbit, citruls, and melons. 4. The four lesser cold seeds, *viz.* endive, scarbola, lettuce, and purslain. See ANISE, FENNEL, &c.

But besides these, there are many other seeds prescribed for their medicinal virtues; as those of coriander, dill, thlaspi, mustard, linseed, fenugreek, carthamus, navew, ricinus, sorrel, psyllium, stavacre, &c. See CORIANDER, &c.

Change of Seed: See CHANGE of Seed.

Seed-wheat should be bought from the crop on a strong clay-land, whatever kind of land it is to be sowed upon. A white clay is a good change for a red clay, and a red clay for a white; but whatever the land be, from which the seed is taken, it may be infected, if that be not changed there the preceding year; and then there may be danger, though it be had from ever so proper a land. It is a rule among the farmers, never to buy seed-wheat from a sandy soil; they express their dislike of this by the coarse rhyme; land is a change for no land.

Steeping of SEED. See the article SMUT.

SEEDLINGS, among gardeners, denote such roots of gilliflowers, &c. as come from seed sown. Also the young tender shoots of any plants that are newly sown.

SEEDY, in the brandy-trade, a term used by the dealers, to denote a fault that is found in several parcels of french brandy,

which renders them unsaleable. The French suppose that these brandies obtain the flavour which they express by this name, from weeds that grow among the vines from whence the wine of which this brandy is made was pressed. However it be, the thing is evident, and the taste not of any one kind, some tasting strongly of aniseed, some of caraway-seed, and some others of the strong flavoured seed of plants. The business of rectification of spirits, Dr. Shaw observes, is very little understood abroad, though much practised with us; and there is no doubt but that the same means which we use to rectify malt spirits, would also serve to purify these brandies. See the article RECTIFICATION.

SEEING, the act of perceiving objects by the organ of sight; or it is the sense we have of external objects by means of the eye. See the article SIGHT.

The apparatus, or disposition, of the parts necessary to seeing, as also the obstruction of that sense from whatever cause, may be seen under the article EYE, and the manner wherein seeing is performed under the article VISION.

SEELING, in the manege, a horse is said to feel when he begins to have white eye-brows, that is, when there grows on that part about the breadth of a farthing of white hairs, mixed with those of his natural colour, which is a mark of old age. It is said, that a horse never feels till he is fourteen years old, and always does before he is sixteen years. The light, sorrel, and black sooner feel than any other. Horse-jockeys usually pull out those hairs with pincers, but if there be so many, that it cannot be done without making the horse look bald and ugly, then they colour their eye-brows, that they may not appear old.

SEELING, at sea, is used in the same sense nearly with heeling: when a ship lies down constantly, or steadily on one side, the seamen say, she heels, and they call it feeling when she tumbles violently and suddenly, by reason of the sea forsaking her, as they call it, that is, the waves leaving her for a time in a howling sea. When a ship thus tumbles to leeward, they call it lee-feel, and in this there is not much danger, even in a storm, because the sea will easily right her up again; but if the rows or feels to windward, there is fear of her coming over too short or suddenly, and so having the sea

sea break right into her, be either founded, or have some of her upper works carried away.

EES, a city of France, in the province of Normandy, situated east longitude $20'$, north latitude $49^{\circ} 46'$.

EGERBERG, a town of Germany, in the circle of Lower Saxony, and dutchy of Holstein, situated 27 miles north-east of Hamburg.

EGEDIN, a city of Upper Hungary, situated on the river Teyss, in east long. 21° , north lat. $46^{\circ} 21'$.

EGESWABE, a city of Transylvania, situated east longitude 24° , north latitude $47^{\circ} 25'$.

EGMENT of a circle, in geometry, that part of the circle contained between a chord and an arch of the same circle. See CIRCLE, ARCH, and CHORD.

Thus the portion AFB (pl. CCXLIV. fig. 2. n^o 1.) comprehended between the arch AFB, and the chord AB, is a segment of the circle ABFD. As it is evident every segment of a circle must either be greater or less than a semicircle, the greater part of the circle cut off by a chord, i. e. the part greater than a semicircle, is called the greater segment, as ADEB, and the lesser part, or the part less than a semicircle, the lesser segment, as AFB.

From what has been said under CIRCLE it appears, that the area of the sector ABCD, n^o 2. is produced by multiplying half of the arch into the radius, and likewise that the area of the segment ADC is found by subtracting from the area of the sector, the area of the triangle ABC. See the article SECTOR.

EGMENT of a sphere, is a part of a sphere terminated by a portion of its surface, and a plane which cuts it off, passing somewhere out of the center; being more properly called the section of a sphere.

The base of such a segment, it is evident, is always a circle for finding the solid contents of the segment of a sphere. See the article FRUSTUM.

EGMENT is sometimes also extended to the parts of the ellipses, and other curvilinear figures.

Line of SEGMENTS. See SECTOR.

SEGMENTUM, among the Romans, an ornament of lace, used by the women on their shoulders, which according to some, resembled our shoulder-knots.

Segmenta were also a kind of tessellated

or mosaic pavements, made up of pieces of various shapes and colours, but which had an uniform and regular arrangement.

SEGMOIDAL, *valves*, in anatomy, little valves of the pulmonary artery, thus called from their resembling segments of circles, but more usually called semilunar valves.

SEGORBE, a city of Spain, in the province of Valencia, situated thirty miles north-west of Valencia.

SEGOVIA, a city of Manila, the largest of the Philippine Islands, situated in east long. 119° , north lat. $18^{\circ} 30'$.

This is also the name of a city of Spain, in the province of Old Castile, situated west long. $4^{\circ} 35'$, north lat. 41° .

SEGRA, a river of Spain, which rising in the north of Catalonia, and running south-west, discharges itself into the Ebro, at Miquinencia.

SEGREANT is the herald's word for a griffon, when drawn in a leaping posture, and displaying his wings as if ready to fly.

SEGUE, in the Italian music, is often found before *aria*, *alleluja*, *amen*, &c. to shew that those portions or parts are to be sung immediately after the last note of that part over which it is writ; but if these words *si piace*, or *ad libitum*, are joined therewith, it signifies, that these portions may be sung or not, at pleasure.

SEGURA, a town of Portugal, in the province of Beira, ten miles north-west of Alcantara. This is also the name of a town in Spain, in the province of New Castile, and territory of La Mancha, situated among the mountains of Segura, west long. $2^{\circ} 50'$, north lat. $38^{\circ} 25'$.

SEJANT, a term used in heraldry, when a lion, or other beast, is drawn in an escutcheon, sitting like a cat, with his fore-feet strait.

SEIGNIORY, *dominium*, in our law, is used for a manor or lordship of a seigneur, or lord of the fee or manor.

SEIGNORAGE, signifies the right, or due belonging to a seigneur, or lord; but it is particularly used for a duty belonging to the prince, for the coining of money; called also coinage, which under our ancient kings, was five shillings for every pound of gold brought in the mass to be coined, and a shilling for every pound weight of silver. At present the king claims no seignorage at all, but the subject has his money coined at the public expence;

expende; nor has the king any advantage therefrom, but what he has from the alloy. See the article COINING.

SEISIN, in law, signifies possession. See the article POSSESSION.

In this sense we say, premier seisin, for the first possession.

Seisin is divided into that in deed or in fact, and that in law; a seisin in deed is where a possession is actually taken; but a seisin in law is, where lands descend, and the party has not entered thereon; or in other words, it is, where a person has a right to lands, &c. and is by wrong disseised of them. A seisin in law is held to be sufficient to avow on; though to the bringing of an assise, actual seisin is required; and where seisin is alledged, the person pleading it, must shew of what estate he is seised, &c. See the article *LIVERY of seisin*.

Seisin of a superior service, is deemed to be a seisin of all inferior and casual services, that are incident thereto; and seisin of a lessee for years, is sufficient for him in reversion.

SEISINA *habenda quia rex habuit annum, diem et vestum*, a writ which lies for delivery of seisin to the lord of lands or tenements, forfeited by a felon, after the king, in right of his prerogative, has had the year, day, and waste therein.

SEISINAM habere facias. See the article *HABERE FACIAS*.

SEISOR. See the article DISSEISOR.

SEIZE, **SEAZE**, or **SEASE**, in the sea-language, is to make fast, or bind, particularly to fasten two ropes together, with rope-yarn. The seizing of a boat is a rope tied to a ring, or little chain in the fore ship of the boat, by which means it is fastened to the side of the ship.

SEIZING, in falconry, is when a hawk gripes her prey, or any thing else fast between her claws.

SEIZURE, in commerce, an arrest of some merchandize, moveable, or other matter, either in consequence of some law, or of some express order of the sovereign. Contraband goods, those fraudulently entered, or landed without entering at all, or at wrong places, are subject to seizure. In seizures, among us, one half goes to the informer, and the other half to the king.

SELAGO, in botany, a genus of the didynamia-angiospermia class of plants, the corolla whereof is monopetalous; the tube is very small, and scarcely perforated; the limb is patent, quinquefid, and

almost equal; there is no pericarpium, the corolla investing the seed, which is single and roundish.

SELBY, a town of Yorkshire, situated ten miles south of York.

SELENDERS, in the manege, are chops, or mangy sores, in the bending of a horse's hough, as the malanders are in the knees. See *MALANDERS*.

SELENEUSIAN EARTH, in natural history, a loose, friable light and white marle, called by late authors, mineral-agaric. See the article *AGARIC*.

SELENITÆ, **MOON STONE**, in natural history, a class of fossils, naturally and essentially simple, not inflammable nor soluble in water, composed of slender filaments, ranged into fine and even thin flakes, and those disposed into regular figures, in the different genera, approaching to a rhomboide, a hexangular column, or a rektangled inequilateral parallelogram, fissil like the talcs, but that not only horizontally, but perpendicularly also, flexile in a small degree, but not at all elastic; not fermenting with acid menstrua, and readily calcining in the fire.

Of this class, Dr. Hill makes seven orders, and under these orders ten genera. The first order is the selenitæ, with horizontal plates, approaching to a rhomboidal form; the second order is the selenitæ with horizontal plates, of a columnar and angular form; the third order comprehends those selenitæ whose filaments are visibly arranged into plates, but in the whole masses appear striated, not tabulated; of the fourth order, are the flat selenitæ, of no determinately angular figure; of the fifth order, are the selenitæ formed of plates perpendicularly arranged; of the sixth order are those selenitæ formed of a congeries of plates, ranged in form of a star; and of the seventh order are those selenitæ of a complex and indeterminate figure. This fossil is found in strata of clay usually of the blue tough kind; we have it in many parts in England, particularly about Shotover hills in Oxfordshire; in several places of Northamptonshire, Leicestershire, and about Epsom, in Surry. In medicine, it is a very powerful astringent, and is of effect in diarrhoeas, dysenteries, and hæmorrhages of all kinds. It stands also recommended as a cosmetic. The people of Northamptonshire call it staunch, and use it in hæmorrhages of all kinds, with success.

SELE-

SELENOGRAPHY, a branch of cosmography, which describes the moon and all the parts and appearances thereof, as geography does those of the earth. See the article **MOON**.

SELEUCIDÆ, in chronology. *Æra* of the seleucidæ, or the syro-macedonian æra, is a computation of time, commencing from the establishment of the seleucidæ, a race of greek kings, who reigned as successors of Alexander the Great, in Syria, as the Ptolomies did in Egypt. This æra we find expressed in the book of the Maccabees, and on a great number of greek medals, struck by the cities of Syria, &c. The rabbins call it the æra of contracts; and the Arabs therik dilkarnain, that is, the æra of the two horns. According to the best accounts, the first year of this æra falls in the year 311 before Christ, being twelve years after Alexander's death.

SELINGENSKOY, a town of Asiatic Muscovy, in the province of Siberia, situated on the road from Tobolski to China, on the river Selinga: in east long. 95°, north lat. 50°.

SELINUM, in botany, a genus of the pentandria digynia class of plants, the general corolla whereof is uniform; the single flowers consist each of five unequal inflexo-cordated petals; there is no pericarpium: the fruit is of an elliptico-oblong, compresso-plane figure, striated each way in the middle, and separable into two parts; the seeds are two, of an oblong elliptic figure, plane on each side, and edged with membranaceous rims at the sides.

SELKIRK, a borough town of Scotland, in the county of Tweedale, situated 32 miles south of Edinburgh.

SELL, in building, is of two kinds, *viz.* ground-sell, which denotes the lowest piece of timber, in a timber-building, and that on which the whole superstructure is raised; and the window-sell, called also window-soil, is the bottom piece in a window-frame.

SELLA EQUINA, TURCICA, or SPHENOIDES, a name given to the four apophyses of the os sphenoides, or cruciforme, in the brain, in regard of their forming a resemblance of a saddle, which the Latins call *sella*. They are sometimes called by the greek name *clinoides*. Herein are contained the pituitary gland, and in some animals, the rete mirabile.

SELTZER water, the name of a mineral-water of Germany, which arises near Neider Seltz, and is now used in

England and many other countries. We call it seltz, or saltzer-water, and the physicians prescribe it in many cases, as scurvies, spasmodic affections, and in consumptions; in the last case, mixing it with asses milk.

SEMEIOTICA, or **SEMEIOSIS**, *semeioticon*, that part of medicine which considers the signs or indications of health and diseases, and enables the physician to judge what is, was, or will be, the state, degree, order, and effect, of health or sickness.

SEMENDRIA, a town of european Turkey, in the province of Servia, situated on the Danube, thirty miles south-east of Belgrade.

SEMENTINÆ FERIÆ, in antiquity, feasts held annually among the Romans, to obtain of the gods a plentiful harvest. They were celebrated in the temple of Tellus, where solemn sacrifices were offered to Tellus and Ceres. These feasts were held about seed-time, usually in the month of January; for Macrobius observes, they were moveable feasts. They had their name from *semen*, seed.

SEMETS, SUMMETS, or SUMMITS, in botany, the same with the antheræ. See article **ANTHERÆ**.

SEMI, a word borrowed from the latin, signifying *half*, but only used in composition with other words, as in the following articles.

In music, *semi* has three several usages; first, when prefixed to the name of a note, it expresses a diminution of half its value, as in *semi-breve*, &c. Secondly, when added to the name of an interval, it expresses a diminution, not of half, but of a lesser semi-tone, or four commas in the whole compass, as in *semi-diapente*, &c. Thirdly, it sometimes also signifies an imperfection, thus, *semi-circolo*, or *circolo-mezzo*, signifies an imperfect circle, which is the mark of imperfect time, that is, of double time; whereas the circle being a character of perfection, marks triple time.

Semi-breve is a note or measure of time, comprehending the space of two minims, or four crotchets, or half a breve. See **MINIM, CROCHET, &c.**

The *semi-breve* is accounted one measure or time, or the integer in fractions and multiples, whereby the time of the other notes is expressed; thus a minim is expressed by $\frac{1}{2}$, a crotchet by $\frac{1}{4}$, &c. that is, by $\frac{1}{4}$ of a measure or *semi-breve*; a breve by two, and a long by four;

four; that is, by four measures or semi-breves.

For the semi-chroma, see the articles CHROMA and QUAVER. For the semi-circolo, see CIRCOLO-MEZZO. For the semi-diapason, semi diapente, semi-diastefaron, see the articles DIAPASON, DIAPENTE, &c.

And for the semi-tone and semi-tonic, see the articles SEMI-TONE and SEMI-TONIC SCALE.

For the several characters of the semi-breve, &c. see the article CHARACTER.

SEMI-ARIANS, in church-history, a branch of the antient arians, consisting of such as in appearance condemned the errors of that heresiarch, but yet acquiesced in some of the principles thereof, only palliating and concealing them under softer and more moderate terms. They would not allow, with the catholics, that the son was homœousios, *i. e.* of the same substance, but homoiousios, *i. e.* of a like substance, with the father; and thus, though, in expression, they differed from the orthodoxy in a single letter only, yet, in effect, they denied the divinity of Jesus Christ, and placed him in the rank of creatures.

SEMI-CIRCLE, in geometry, half a circle, or that figure comprehended between the diameter of a circle and half the circumference. See the article CIRCLE.

SEMI-CIRCLE is also an instrument used in surveying, otherwise called graphometer. See the article GRAPHOMETER.

SEMI-COLON, in grammar, one of the points or stops used to distinguish the several members of sentences from each other. See PUNCTUATION.

The mark, or character, of the semi-colon is (;) and has its name as being somewhat of less effect than a colon, or as demanding a shorter pause. The use of the semi-colon, the grammarians generally say, is to mark a sense less complete than the colon, and more complete than a comma; but this conveys a very obscure idea: besides, our best writers seem to use them promiscuously. See COLON.

But Mr. Ward, who is said to have first settled a just use of the semi-colon, holds, that it is properly used to distinguish the conjunct members of sentences. Now by a conjunct member of a sentence, he means such a one as contains at least two simple members. Whenever then a sentence can be divided into several members of the same degree, which are again divisible into other simple members, the

former are to be separated by a semi-colon. But though the proper use of the semi-colon be to distinguish conjunct members, it is not necessary that all the members divided hereby be conjunct; for upon dividing a sentence into great and equal parts, if one of them be conjunct, all those other parts of the same degree are to be distinguished by a semi-colon. See the article SENTENCE, &c.

SEMI-CUBICAL *parabola*, in the higher geometry, a curve of the second order wherein the cubes of the ordinates are as the squares of the abscissæ. Its equation is $axx = y^3$.

SEMI-CUPIUM; in medicine, an half-bath wherein the patient is only placed up to the navel.

SEMI-DIAMETER, half the diameter, or a right line drawn from the center of a circle, or sphere, to its circumference; being the same with what is otherwise called the radius. See the article RADIUS. The distances, diameters, &c. of the heavenly bodies, are usually estimated, by astronomers, in semi-diameters of the earth; and the distances of the secondary planets from their respective primary ones, by semi-diameters of the body of the primary planet. See DISTANCE, DIAMETER, and PLANET.

SEMI-DOUBLE, in the romish breviary, a term applied to such offices and festivals as are celebrated with less solemnity than the double ones, but yet with more than the single ones. The semi-double office has double vespers, and nine lessons at matins, but the anthems are not redoubled. It is performed on Sundays, on the octaves; and on feasts, marked for semi-double in the calendar.

SEMI-FLOSCULOUS, in botany, a term used to express the flowers of a certain class of plants, of which the dandelion, hawk-weed, and the like, are kinds. These semifloscules are petals, hollow in their lower part, but in their upper flat, and continued in the shape of a tongue. See the article FLOSCULOUS.

SEMIGALIA, the eastern division of the duchy of Courland in Poland.

SEMI-INTEROSSEUS INDICIS, in anatomy, a small, short, flat muscle, very like the antithenar, or internal semi-interosseus of the thumb. It is situated obliquely on one side of that of the thumb, between the first phalanx thereof and the first metacarpal bone. It is fixed by one end to the outside of the basis of the first phalanx of the thumb, and by the

the other end it is fixed near the head of the first phalanx of the index, on that side next the thumb.

SEMI-LUNAR VALVES, in anatomy, are three small valves, or membranes, of a semi-lunar figure, placed in the orifice of the pulmonary artery, to prevent the relapse of the blood into the heart at the time of its dilatation. See **HEART**.

SEMI-MEMBRANOSUS, in anatomy, a long, thin muscle, partly tendinous, situated on the backside of the thigh, a little towards the inside; being one of the five flexors of the tibia. It arises from the tubercle of the ischium.

SEMI-ORDINATE, in conics, &c. the half of an ordinate. See **ORDINATE**.

SEMI-PARABOLA, in geometry, a curve defined by the equation $ax^{m-1} = y^m$; as $ax^2 = y^3$, and $ax^3 = y^4$. See the article **PARABOLA**.

In semi-parabolas, $y^m : v^m :: ax^{m-1} : az^{m-1} = x^{m-1} : z^{m-1}$; or the powers of the semi-ordinates are, as the powers of the semi-abscisses one degree lower; for instance, in cubical semi-parabolas the cubes of the ordinates are as the squares of the abscisses; that is, $y^3 : v^3 :: x^2 : z^2$.

SEMI-PELAGIANS, in church-history, a branch of the pelagians, so called because they pretended to keep a medium between the pelagians and the orthodox. See the article **PELAGIANS**.

SEMI-PROOF, or **HALF-PROOF**, in matters of law. See the article **PROOF**.

SEMI-QUARTILE, or **SEMI-QUADRATE**, the same with **OCTANT**. See **OCTANT**.

SEMI-QUAVER, in music. See **QUAVER**.

SEMI-QUINTILE, an aspect of the planets when thirty-six degrees from each other. See the article **ASPECT**.

SEMI-SEXTILE, marked S. S. is an aspect of two planets when distant only thirty degrees.

SEMI-TONE, in music, one of the degrees or concinnous intervals of concords. The ratio of the semi-tone is 15 : 16. See the article **TONE**.

SEMI-TONIC scale, a scale, or system of music, consisting of twelve degrees in the octave, being an improvement of the diatonic-scale, by inserting between each two notes thereof another note, which divides the interval or tone into two unequal parts called semi-tones. See the article **DIATONIC**.

SEMINAL, *feminalis*, in anatomy and
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medicine, something belonging to the semen, or seed. See the articles **SEED** and **SPERMATIC**.

SEMINARY, a kind of college, or school, where youth are instructed in the ceremonies, &c. of the sacred ministry, of which there are many abroad; it being ordained, by the council of Trent, that there be a seminary belonging to each cathedral, under the direction of the bishop.

In the reign of queen Elizabeth, the roman catholics projected the founding english seminaries abroad, in order from thence to be furnished with missionaries to perpetuate and increase their communion in Britain. But, by a statute of that prince's, it is made a premunire to contribute to the maintenance of a popish seminary: and by one of James I. no persons are to go, or be sent, to popish seminaries, to be instructed or educated, under divers penalties and disabilities mentioned in the statute.

SEMINARY, in gardening, denotes the seed-plot, or place allotted for raising plants from seed, and keeping them till they are fit to be removed into the garden or nursery.

When the seminary is intended for trees, it must be large, and of a soil adapted to the generality of the trees intended to be raised in it: but that which is most in use is for the supply of the flower-garden, and is the place where flowers are to be raised from their seeds, to procure varieties; or, as the florists express it, new flowers; as also for the sowing all the biennial plants, to succeed those which decay in the flower-garden.

The seminary should always be situated at some distance from the house, and be walled or paled round, and kept under lock and key, to keep out dogs, &c. and to prevent a great deal of damage that is frequently done by those who are not acquainted with gardening, before they are aware of it. The several directions for the management of the seminary, are to be seen under the names of the several plants intended to be raised in it.

SEMINATION, in natural history, denotes the manner, or act, of shedding and dispersing the seeds of plants, which is effected several ways. Some are heavy enough to fall directly to the ground; others are furnished with a pappus, or down, that they may, by means thereof, be dispersed by the wind; and others
again

again are contained in elastic capsules, which bursting open with considerable force, dart or throw out the seeds to different distances.

SEMINERVOSUS, in anatomy, one of the flexor muscles of the leg, which arises from the ischium, and is inserted into the upper part of the tibia.

SEMIS, in roman antiquity, the half of an as. See the article **AS**.

SEMISPINALIS, or **SEMISPINOSUS**, in anatomy, one of the extensor muscles of the back and loins, has its origin from the os sacrum and vertebræ of the loins, and its termination at the upper vertebræ of the thorax, especially at their spinose apophyses: it coheres very firmly to the longissimus dorsi and sacro-lumbaris, the other two extensors of the back and loins.

SEMITA LUMINOSA, a name given to a lucid tract in the heavens, which may be seen about six o'clock at night, a little before the vernal equinox, extending from the western edge of the horizon up towards the pleiades.

Cassini and Facio have both observed this phenomenon; the former thinks it arises from a vast number of small planets encompassing the sun, which give this light from reflection.

SEMLIN, or **ZEMLIN**, a town of Slavonia, subject to the house of Austria, east long. 21°, and north lat. 45°.

SEMPERVIVUM, in botany, a genus of the dodecandria-polygynia class of plants, the corolla whereof consists of twelve oblong, lanceolated, acute, hollow petals, a little larger than the cup; the fruit consists of twelve oblong compressed capsules, placed in an orbicular order, acuminate outwards, and opening internally; the seeds are numerous, roundish, and small.

This genus comprehends the great house-leek and the tree-houseleek.

This plant stands recommended as a cooler; though its sensible qualities discover no great foundation for any virtue of this kind.

SEMUR, the name of two towns of Burgundy, in France, one thirty-four miles west of Dijon, and the other forty six miles north-west of Lyons.

SENA, or **SENNA**, in botany, a shrub with crooked and compressed fruit, and lanceolated pinnæ: it is a species of cassia. See the article **CASSIA**.

Sena leaves are much used for their purgative virtue; but are apt to gripe, un-

less given with proper correctives, as cianther, aniseed, ginger, raisins, and of tartar; which are added to the infusion of the leaves, occasionally: but there is no corrective so effectual, as diluting with a large quantity of the liquid infusion is taken in, as broth or water-gruel. This, and the method of correcting it by the alkaline salts, are the only proper ones; because they have it in force as a purgative, and indeed rather add to it than otherwise. In inflammatory cases, hæmorrhages, and disorders of the breast, sena is to be avoided as a purge; but, in all other cases, it is safe and excellent cathartic.

The pods of sena are also purgative, and are observed to gripe the patient less; but then they also purge less, so that they require to be given in a much larger dose, and even then operate but languidly.

SENATE, *senatus*, in general, is an assembly, or council, of senators; that is, of the principal inhabitants of a state who have a share in the government.

The senate of antient Rome is, of all others, the most celebrated: it exercised no contentious jurisdiction, but appointed judges, either from among the senators or knights, to determine processes; it also appointed governors of provinces, and disposed of the revenues of the commonwealth, &c. Yet did not the whole sovereign power reside in the senate, since it could not elect magistrates, make laws, or decide of war and peace; in all which cases the senate was obliged to consult the people.

According to Dr. Middleton, the constant and regular supply of the senate was from the annual magistrates; who, by virtue of their several offices, acquired a right to sit and vote in that assembly: the usual gradation of these offices being that of quæstor, tribune of the people, ædile, prætor, and consul. See the articles **QUÆSTOR**, **TRIBUNUS**, &c.

But though these offices gave both an immediate right, and actual entrance into the senate; yet the senatorial character was not esteemed complete, till the new senators had been enrolled by the censors, at the next general lustrum, or review of all the orders of the city. See the articles **CENSOR** and **LUSTRUM**.

The senate always met of course on the first of January, for the inauguration of the new consuls; and in all months universally, there were three days, *viz.* the calends, nones, and ides, on which it regularly

regularly met: but it always met on extraordinary occasions, when called together by consul, tribune, or dictator.

SENATOR, in general, denotes a member of some senate.

SENATUS AUCTORITAS, a vote of the roman senate, drawn up in the same form with a decree, but without its force, as having been hindered from passing into a decree, by some of the tribunes of the people.

SENATUS CONSULTUM, a decree of the roman senate, pronounced on some question or point of law; which, when passed, made a part of the roman law. See the article **CIVIL LAW**.

SENECA, or **SENEGA**. See **SENEGA**.

SENECIO, **GROUNDSEL**, in botany, a genus of the syngenesia-polygamia-superflua class of plants, with a flosculous flower, contained in a one-leaved cup; there is a single downy seed, after each floscule. Common groundsel, taken in a strong infusion, is emetic: it is prescribed in small doses in the jaundice, dropsy, and hæmorrhages; and externally it is used in ointments, for disorders of the skin.

SENEF, a town on the confines of Hainault, twelve miles east of Mons.

SENEGA, or **SENEGAL**, a river of Negroland, in Africa, which falls into the Atlantic ocean, in 16° north lat. whence the gum senega is imported. See the article **GUM**.

SENEGA, **SENECA**, or **SENEKA**, **RATTLE-SNAKE-ROOT**, in the materia medica. See the article **SERPENTARIA**.

SENECHAL, *seneschallus*, a term antiently used for steward, or majordomo. See the article **STEWARD**.

SENEZ, a town of Provence, in France, forty-six miles north-east of Aix.

SENLIS, a town of the Isle of France, twenty-six miles north of Paris.

SENNÄ, or **SENA**. See the article **SENA**.

SENNE, a river of the austrian Netherlands, which, rising in Hainault, passes by Brussels, and falls into the Demer, below Mechlin.

SENOBLE, or **SINOPE**. See **SINOPE**.

SENS, a town of Champain, in France, situated on the river Yonne, sixty miles south-east of Paris.

SENSATION, in philosophy, the art of perceiving external objects, by means of the senses. See the articles **SENSE** and **PERCEPTION**.

SENSE, a faculty of the soul, whereby it perceives external objects, by means of the impressions they make on certain or-

gans of the body. These organs of sensation are commonly reckoned five, *viz.* the eye, whereby we see objects; the ear, which enables us to hear sounds; the nose, by which we receive the ideas of different smells; the palate, by which we judge of tastes; and the cutis, or skin, which enables us to feel the different forms, hardness, or softness of bodies. See the articles **EYE**, **EAR**, &c. as also **VISION**, **HEARING**, &c.

Some also give the name of internal senses to the determinations of the mind to be pleased with certain forms and ideas, perceived by the means of corporeal organs of sense; and hence they use the term moral sense; for a determination of the mind to be pleased with the contemplation of those affections, actions, or characters, which we call virtuous.

SENSITIVE SOUL, a denomination given to the souls of brutes, either as intimating its utmost faculty to be that of sensation; or because it is supposed to be corporeal, so as to be an object of our senses. See the article **SOUL**.

SENSITIVE PLANT, *mimosa*, in botany, a genus of the polyandria-monogynia class of plants, with a small, funnel-fashioned, semi-quinquifid flower: its fruit is a long pod, containing a great many roundish seeds.

This genus comprehends the mimosa or sensitive plant, the acacia of Tournefort, and the inga of Plumier.

The sensitive plant is so denominated from its remarkable property of receding from the touch, and giving signs, as it were, of animal life and sensation: this motion it performs by means of three distinct articulations, *viz.* of a single leaf with its pedicle, of the pedicle to its branch, and of the branch to the trunk or main stem; the primary motion of all which is the closing of the two halves of the leaf on its rib; then the rib or pedicle itself closes; and if the motion wherewith the plant is moved be very strong, the very branches have the sensation propagated to them, and apply themselves to the main stem, as the simple leaves did before to their ribs, and these ribs to their branches; so that the whole plant, in this state, forms itself, from a very complexly branched figure, into a sort of straight cylindrical one.

SENSORY, *sensorium commune*, the seat of the common sense, or what receives the impressions of all sensible objects, conveyed to it by the nerves of each particular

cular organ, and consequently is the immediate cause of perception. This office is, by Dr. Willis, attributed to the striated part of the brain; and by Des Cartes to the glandula pinealis.

SENTENCE, in law, a judgment passed in court by the judge, on some process, either civil or criminal.

SENTENCE, in grammar, a period or set of words, comprehending some perfect sense or sentiment of the mind. See the article **POINTING**.

SENTENCE, in poetry, is an instructive and lively remark made on something very observable and agreeably surprising, which contains much sense in few words.

It is either direct or plain, as, "In all the affairs of the world, so much reputation is really so much power;" or indirect or disguised, as,

"Fool, not to think how vain

Against th' Omnipotent to rise in arms." This is a very dexterous and prevailing way of bringing in a sentence. You are entertained with a noble reflection, when you did not expect it; and pleasantly surprized and instructed, without the appearance or formality of art. Not to come down to useless nicety and distinction, a sentence appears with most beauty and advantage, when it is put into some of these following forms.

1. When it is expressed in any way of exclamation, but peculiarly of wonder or indignation: as,

"How advantageous is it to pass thro' adversities, to the enjoyment of prosperity!"

"How sharper than a serpent's tooth it is, to have a thankless child!"

2. When it is put into a moving expostulation, or pressing interrogation.

"Are these our scepters? these our due rewards?"

And is it thus that Jove his plighted faith regards?"

3. When the sentence is delivered, and a reason immediately added to support it.

"In a government, it is much better to be unmindful of good services than bad; for a good man only becomes more slow, when you take no account of him; a bad man, more daring and insolent."

4. When a sentence is made up of a short relation, and a clean and pertinent remark upon it.

"Messalina desired the name of matrimony (with her adulterer Silius) pure-

ly for the greatness of the infamy; which is the last pleasure of profligate people." And this is near a-kin to the epiphonema. See **EPIPHONEMA**.

Sentences must not stand awkward and bulky out of the discourse, but be neatly interwoven and wrought into it.

They must be unaffected and significant, and such as the subject easily suggests to thoughtful and distinguishing man. Sentences are the ornaments and lights of a discourse; and therefore, as lights and shades are in a good picture, so ought sentences to be so exactly and judiciously mixed with the other parts of the discourse, that all together may make up one uniform beauty, one regular and consummate piece.

SENTIMENTS, in poetry, and especially dramatic, are the thoughts which the several persons express, whether they relate to matters of opinion, passion, business, or the like.

SENTINEL, **CENTINEL**, or **CENTRY**, in military affairs, is a private soldier, placed in some post, to watch any approach of the enemy, to prevent surprizes, and to stop such as would pass without order, or discovering who they are.

SEPARATION, a term sometimes used for what is more usually called departure. See the article **DEPARTURE**.

SEPARATISTS, an appellation given to dissenters, from their setting up a separate church from the established one. See the articles **CHURCH** and **DISSENTERS**.

SEPIA, the **INK FISH**, or **CUTTLE FISH**, in zoology, a genus of remarkable sea-insects, of an oblong figure, and depressed: it has ten tentacula, two of which are longer than the rest, and are pedunculated.

There are several species of this animal, different in size and other properties: but that properly called the cuttle-fish is about six inches in length and three and a half in diameter; and is supported by an oblong, light, and spongy substance, of a friable texture, and lined with a light fungous pith: this is what our silversmiths use, under the name of cuttle-bone; and is also used in tooth-powders, as a dentrifice. This animal is frequent in the European seas, but is not common on our coasts: when in danger of being taken, it is said to emit at its mouth a liquor of a black colour, like ink, in a considerable quantity, which obscures the water about it, and gives it an opportunity of escaping.

SEPS,

EP5, in zoology, a species of lizard, with longitudinal black lines: its bite is said to be very fatal. See the article **LIZARD**.
EPTA OVILIA, in roman antiquity. See the article **OVILIA**.

EPTARLÆ, in natural history, a large class of fossils, commonly known by the names of ludus Helmontii and waxen veins.

They are defined to be fossils not inflammable, nor soluble in water; of a moderately firm texture, and dusky hue, divided by several septa, or thin partitions, and composed of a sparry matter greatly debased by earth, not giving fire with steel, fermenting with acids, and in great part dissolved by them, and calcining in a moderate fire.

Of this class there are two distinct orders of bodies, and under those six genera. The septariæ of the first order are those which are usually found in large masses, of a simple uniform construction, but divided by large septa either into larger and more irregular portions, or into smaller and more equal ones, called talc. The genera of this order are four: 1. Those divided by septa of spar, called socomiæ. 2. Those divided by septa of earthy matter, called gaiophragmia. 3. Those divided by septa of the matter of the pyrites, called pyritercia. And, 4. Those divided by septa of spar, with an admixture of crystal, called diaiophragmia. See all these under their several heads.

Those of the second order are such as are usually found in smaller masses, of a crustated structure, formed by various incrustations round a central nucleus, and divided by very thin septa. Of this order are only two genera: 1. Those with a short roundish nucleus, enclosed within the body of the mass. And, 2. Those with a long nucleus, standing out beyond the ends of the mass.

SEPTEMBER, the ninth month of the year, consisting of only thirty days: it took its name as being the seventh month, reckoning from March, with which the Romans began their year. See the articles **YEAR** and **MONTH**.

SEPTENTRIO, in astronomy, a constellation more usually called *ursa minor*. See the article **URSA**.

In cosmography, the term *septentrio* denotes the same with north: and hence, *septentrional* is applied to any thing belonging to the north, as *septentrional signs*, *parallels*, &c. See **SIGN**, &c.

SEPTIER, or **SETIER**, a french measure of capacity. See **MEASURE**.

SEPTIZON, or **SEPTIZONIUM**, in roman antiquity, a celebrated mausoleum, built by Septimus Severus, in the tenth region of the city of Rome: it was so called from *septem* and *zona*, by reason it consisted of seven stories, each of which was surrounded by a row of columns.

SEPTUAGESIMA, in the calendar, denotes the third Sunday before lent, or before quadragesima Sunday: supposed by some to take its name from its being about seventy days before easter.

SEPTUAGINT, the name given to a greek version of the books of the Old Testament, from its being supposed to be performed by seventy-two Jews, who are usually called the seventy interpreters, because seventy is a round number.

The history of this version is expressly written by Aristeas, an officer of the guards to Ptolemy Philadelphus, the substance of whose account is as follows: Ptolemy having erected a fine library at Alexandria, which he took care to fill with the most curious and valuable books from all parts of the world, was informed that the Jews had one, containing the laws of Moses, and the history of that people, and being desirous of enriching his library with a greek translation of it, applied to the high-priest of the Jews; and to engage him to comply with his request, set at liberty all the Jews, whom his father Ptolemy Soter had reduced to slavery. After such a step, he easily obtained what he desired; Eleazar, the jewish high-priest, sent back his ambassadors with an exact copy of the mosaical law, written in letters of gold, and six elders of each tribe, in all seventy-two, who were received with marks of respect by the king, and then conducted into the isle of Pharos, where they were lodged in a house prepared for their reception, and supplied with every thing necessary in abundance. They set about the translation without loss of time, and finished it in seventy-two days; and the whole being read in the presence of the king, he admired the profound wisdom of the laws of Moses; and sent back the deputies, laden with presents for themselves, the high-priest, and the temple.

This version was in use to the time of our blessed Saviour, and is that out of which all the citations in the New Testament, from the Old, are taken. It was also the ordinary and canonical translation made

made use of by the christian church in the earliest ages; and it still subsists in the churches both of the east and west. It is however observable, that the chronology of the septuagint is different from the hebrew text. See the article EPOCHÆ.

SEPTUM, in anatomy, an inclosure, or partition, a term applied to several parts of the body, which serve to separate one part from another: as, 1. The septum lucidum, or pellucidum, is a partition which separates the upper ventricles of the brain, and is composed of a fine medullary substance, formed into two sides, with a longitudinal cavity between them. 2. Septum cordis, a separation between the two ventricles of the heart, which is about a finger thick, of the same substance with the heart itself, and consisting of muscular fibres, which assist it in all its motions. For the septum transversum, septum narium, septum of the scrotum, &c. see DIAPHRAGM, NOSE, SCROTUM, &c.

SEPULCHRAL, something belonging to sepulchres or tombs: thus a sepulchral column is a column erected over a tomb, with an inscription on its shaft; and sepulchral lamps, those said to have been found burning in the tombs of several martyrs and others.

SEPULCHRE, a tomb, or place destined for the interment of the dead. This term is chiefly used in speaking of the burying places of the antients, those of the moderns being usually called tombs.

Sepulchres were held sacred and inviolable, and the care taken of them has always been held a religious duty, grounded on the fear of God, and the belief of the soul's immortality. Those who have searched or violated them, have been thought odious by all nations, and were always severely punished.

The Egyptians called sepulchres, eternal houses, in contradistinction to their ordinary houses or palaces, which they called inns, on account of their short stay in the one, in comparison of their long abode in the other.

Regular canons of St. SEPULCHRE, a religious order, formerly instituted at Jerusalem, in honour to the holy sepulchre, or the tomb of Jesus Christ.

Many of these canons were brought from the Holy Land into Europe, particularly into France, by Lewis the younger; into Poland, by Jaxa a Polish gentleman; and into Flanders by the counts thereof; many also came into England. This order was however suppressed by pope In-

nocent VIII. who gave its revenues and effects to that of our Lady of Bethlehem which also becoming extinct, they were bestowed on the knights of St. John Jerusalem. But the suppression did not take effect in Poland, where they still subsist, as also in several provinces of Germany. These canons follow the rule of St. Augustine.

Knights of the holy SEPULCHRE, a military order, established in Palestine about the year 1114.

The knights of this order in Flanders chose Philip II. king of Spain, for their master, in 1558, and afterwards his son; but the grand master of the order of Malta prevailed on the last to resign: and when afterwards the duke of Nevers assumed the same quality in France, the same grand master, by his interest and credit, procured a like renunciation of him, and a confirmation of the union of this order to that of Malta.

SEQUEL, in logic, the same with conclusion. See the article CONCLUSION.

SEQUENCE, in gaming, a set of cards immediately following each other, in the same suit, as a king, queen, knave, &c. and thus we say, a sequence of three, four, or five cards: but at piquet these are called tierces, quarts, quints, &c.

SEQUESTRATION, in common-law, is setting aside the thing in controversy from the possession of both the parties that contend for it. In which sense it is either voluntary, as when done by the consent of the parties; or necessary, as where it is done by the judge, of his own authority, whether the parties will or not.

A sequestration is also a kind of extent on an execution for debt, in the case of a beneficed clergyman, of the profits of his living, directed to the church-wardens, to receive the same, to satisfy the judgment.

Sequestration is granted on a person's standing out all the processes of contempt for non-appearance in the court of chancery, or exchequer, upon a bill exhibited; and also where obedience is not yielded to a decree, in which case the court grants a sequestration of the parties lands.

A sequestration is also made in London, upon an action of debt; the course of proceeding in which case is this: the action being entered, the officer goes to the defendant's shop or warehouse, when no person is there, and takes a padlock, and hangs it on the door, uttering these words:

"I do sequester this warehouse, and the goods and merchandize therein, of the defendant in this action, to the use of the plaintiff," &c. after which he sets on his seal, and makes a return of the sequestration in the comptur; and four days being passed after the return-made, the plaintiff may, at the next court, have judgment to open the shop or warehouse, and to have the goods appraised by two freemen, who are to be sworn at the next court held for that comptur; and then the serjeant puts his hand to the bill of appraisement, and the court grants judgment thereon: but yet the defendant may put in bail before satisfaction, and by that means dissolve the sequestration; and after satisfaction, may put in bail to disprove the debt, &c.

In the time of the civil wars, sequestration was used for a seizing of the estates of delinquents, for the use of the commonwealth.

SEQUESTRATION, in the civil law, is also used in various senses: it is taken for the act of the ordinary in disposing of the goods of a deceased person, which no body will meddle with. A widow is said to sequester, when she disclaims having any thing to do with the estate of her deceased husband. Sequestration is also used to signify the gathering up the fruits of a vacant benefice, for the use of the next incumbent of the church.

EQUIN, a gold-coin, struck at Venice, and in several parts of the grand seignor's dominions. See the article **COIN**.

SERAGLIO, a persian word, which signifies the palace of a prince or lord, in which sense the houses of the ambassadors of England, France, &c. are, at Constantinople, called their seraglios. But the term seraglio is used, by way of eminence, for the palace of the grand seignor at Constantinople, where he keeps his court, in which his concubines are lodged, and where the youth are trained up for the principal posts of the empire. It is in form of a triangle, about two miles round, at the end of the promontory Chrysoceras, now called the Seraglio-point: the buildings extend to the top of the hill, and from thence there are gardens, that reach to the sea. The outward appearance is not very beautiful, the architecture being irregular, consisting of separate edifices, in the manner of pavilions and domes. The old seraglio is the palace where the grand seignor's old mistresses are kept.

The ladies of the harem, which is the part allotted to the women, is a collection of young beautiful girls, who, on their admission, are committed to the charge of some old lady, and taught music, dancing, and other accomplishments. These frequently play and dance before the grand seignor, while others entertain him with their conversation. Besides these ladies, there are a great many black eunuchs, and female slaves, in the seraglio, whose business it is to guard and wait upon them.

SERAPH, or **SERAPHIM**, a spirit of the highest rank in the hierarchy of angels; who are thus called from their being supposed to be most inflamed with divine love, by their nearer and more immediate attendance at the throne of God, and to communicate their fervour to the remoter and inferior orders. See the article **ANGEL**.

SERAPHIC, burning or inflamed with love or zeal, like a seraphim: thus St. Bonaventure is called the seraphic doctor, from his abundant zeal and fervor.

St. Francis, founder of the cordeliers and franciscans, is called the seraphic father, in memory of a pretended vision on mount Alverna, in which, it is said, he saw a seraph glide rapidly from heaven, who impressed on him certain marks, representing the wounds which the nails and spear made in our Saviour's body, at his crucifixion.

SERAPIAS, **BASTARD-HELLEBORE**, in botany, a genus of the gynandria-dianthia class of plants, the flower of which consists of five ovato-oblong petals; and its fruit is an oval unilocular capsule, obtusely trigonal, containing a great many scabiform seeds.

This genus comprehends the helleborine of Tournefort.

SERAVALLE, a town of Italy, in the dutchy of Milan, twenty-four miles north of the city of Genoa.

SERCELLI, a port-town of Algiers, on the coast of Barbary: east long. 4°, and north lat. 37°.

SEREGIPPE, a city and port-town of Brazil, in the bay of All Saints: west long. 39°, and south lat. 11°.

SERENA, the same with coquimbo. See the article **COQUIMBO**.

Gutta SERENA, in medicine. See the article **GUTTA SERENA**.

SERENADE, a kind of concert given in the night, by a lover to his mistress, under her window. These sometimes only consist

sist of instrumental music, but at other times voices are added: the music and songs composed for these occasions are also called serenades.

SERENE, a title of honour given to several princes, and to the principal magistrates of republics. The king of England, the republic and the doge of Venice, and the children of the king of Spain are called most serene: and when the pope, or the sacred college, write to the emperor, to kings, or the doge, they give them no other title: in like manner the emperor gives no other title to any king, except to the king of France.

Bishops were antiently addressed under the title of serene: and the kings of France, of the first and second race, when speaking of themselves, used no other title but *notre sérénité*. The king of Poland and other kings give the title of serene to the electors; but the emperor, on writing to the electors or other princes of the empire, only uses the term *dilection*; yet in treating with them, he uses electoral serenity to the electors, and ducal serenity to the other princes. The Venetians set the title of serenity above that of highness.

SERGE, in commerce, a woollen stuff manufactured in a loom, of which there are various kinds, denominated either from their different qualities, or from the places where they are wrought; the most considerable of which is the london-serge, which is highly valued abroad, and of which a manufacture has been for some years carried on in France.

In the manufacture of london-ferges, the longest wool is chosen for the warp, and the shortest for the woof. But before either kind is used, it is first scoured, by putting it in a copper of liquor, somewhat more than lukewarm, composed of three parts of fair water and one of urine. After it has staid in it long enough for the liquor to take off the grease, &c. it is stirred briskly about with a wooden peel, taken out, drained, washed in a running water, and dried in the shade; beaten with sticks on a wooden rack, to drive out the coarser dust and filth; and then picked clean with the hands. It is then greased with oil of olives, and the longest wool combed with large combs, heated in a little furnace for that purpose: to clear it from the oil, it is put into a vessel of hot soap-water, whence being taken out, wrung, and dried, it is spun on the wheel. As to the shorter wool, intend-

ed for the woof, it is only carded on the knee with small fine cards, and then spun on the wheel, without being scoured of its oil: and here it is to be observed, that the thread for the warp is always to be spun finer, and much better twisted than that of the woof.

The wool both for the warp and woof being spun, and the thread reeled in skains; that of the woof is put on spools fit for the cavity of the shuttle; and that for the warp is wound on a kind of wooden bobbins, to fit it for warping; and when warped, it is stiffened with size, usually made of the shreds of parchment; and, when dried, put into the loom, and mounted so as to be raised by four treddles, placed under the loom, which the workman makes to act transversely, equally, and alternately, one after another, with his feet; and as the threads are raised, throws the shuttle. See the article **WEAVING**.

The serge, on being taken from the loom, is carried to the fuller, who fuls or scours it, in the trough of his mill with fullers-earth: and after the fulling, the knots, ends, straws, &c. sticking out on either side of the surface are taken off with a kind of plyers or iron pincers, after which it is returned in the fulling-trough, where it is worked with warm water, in which soap has been dissolved; when quite cleared, it is taken out, the knots are again pulled out, it is then put on the tenter to dry, taking care, as fast as it dries, to stretch out both in length and breadth, till it brought to its just dimensions; then being taken off the tenter, it is dyed, sheared and pressed.

SERGEANT, or **SERJEANT at law**, *of the coif*, is the highest degree taken in the common law, as that of doctor of the civil law; and as these are supposed to be most learned and experienced in the practice of the courts, there is a court appointed for them to plead in themselves, which is the common-plea, where the common law of England is most strictly observed: but they are restrained from pleading in any other court, where the judges, who can have that honour till they have taken the degree of sergeant at law, call them brothers.

These sergeants are created by the king's writ, commanding them to take up the law, and to have that degree therein assigned, upon a great penalty: and one or more of them

is stiled the king's serjeant, who is chosen out of the rest to plead for him in all causes, more especially those of treason, &c.

SERGEANT at arms, or *mace*, an officer appointed to attend the person of the king, to arrest traitors, and such persons of quality as offend; and to attend the lord high steward when sitting in judgment on a traitor.

The number of these officers is by statute limited to that of thirty: there are now eight at court, who are created with great ceremony; for the person kneeling before the king, his majesty lays the mace on his right shoulder, and says, "rise up, serjeant of arms, and esquire, for ever." They attend in the presence-chamber where the band of gentlemen-pensioners wait; and receiving the king at the door, they carry the maces before him, when he goes to chapel, or the house of lords. There are four other serjeants at arms created in the same manner; one of whom attends the lord chancellor; a second, the lord treasurer; a third, the speaker of the house of commons; and a fourth, the lord-mayor of London, on solemn occasions. There is also an inferior kind of serjeants at mace, who attend the mayor, or other head officer of corporations.

SERGEANT, or **SERJEANT**, in war, is an inferior officer in a company of foot, or troop of dragoons, armed with an halbard, and appointed to see discipline observed, to teach the soldiers the exercise of their arms, and to order, straiten, and form ranks, files, &c.

SERGEANTY, or **SERJEANTY**, in law, is taken for a service that cannot be due from a tenant to any other lord besides the king.

This is divided into grand and petit serjeanty. Grand serjeanty is where a person holds lands of the king, by such service as he ought to perform in person, as to assist at his coronation, bear his banner or spear, &c. Petit serjeanty is when a man holds lands of the king, on account of his paying him annually some small thing towards his wars, as a sword, dagger, &c.

The honorary services of grand serjeanty still continue, notwithstanding the statute 12 Car. II. c. 24.

SERICUM, **SILK**, in natural history. See the article **SILK**.

Sericum is also a name given to the flow-

ers of zink, on account of their fibrous texture. See the article **ZINK**.

SERIES, in general, denotes a continued succession of things in the same order, and having the same relation or connection with each other: in this sense we say, a series of emperors, kings, bishops, &c.

In natural history, a series is used for an order or subdivision of some class of natural bodies; comprehending all such as are distinguished from the other bodies of that class, by certain characters, which they possess in common, and which the rest of the bodies of that class have not. See **CLASS**, **ORDER**, **GENUS**, &c.

SERIES, in mathematics, is a number of terms, whether of numbers or quantities, increasing or decreasing in a given proportion; the doctrine of which has already been given under the article **PROGRESSION**.

Infinite SERIES, is a series consisting of an infinite number of terms, that is, to the end of which it is impossible ever to come; so that let the series be carried on to any assignable length, or number of terms, it can be carried yet farther, without end or limitation.

A number actually infinite (that is, all whose units can be actually assigned, and yet is without limits) is a plain contradiction to all our ideas about numbers; for whatever number we can conceive, or have any proper idea of, is always determinate and finite; so that a greater after it may be assigned, and a greater after this; and so on, without a possibility of ever coming to an end of the addition or encrease of numbers, assignable; which inexhaustibility, or endless progression in the nature of numbers, is all we can distinctly understand by the infinity of number; and therefore to say that the number of any things is infinite, is not saying, that we comprehend their number, but indeed the contrary; the only thing positive in this proposition being this; that the number of these things is greater than any number which we can actually conceive and assign. But then, whether in things that do really exist, it can be truly said, that their number is greater than any assignable number; or, which is the same thing, that in the numeration of their units one after another, it is impossible ever come to an end; this is a question about which there are different opinions,

with which we have no business in this place; for all that we are concerned here to know, is this certain truth, that after one determinate number, we can conceive a greater, and after this a greater, and so on without end. And therefore, whether the number of any things that do or can really exist all at once, can be such that it exceeds any determinable number, or not, this is true, that of things which exist, or are produced successively one after another, the number may be greater than any assignable one; because though the number of things thus produced, that does actually exist at any time, is finite, yet it may be increased without end. And this is the distinct and true notion of the infinity of a series; that is, of the infinity of the number of its terms, as it is expressed in the definition.

Hence it is plain, that we cannot apply to an infinite series the common notion of a sum, *viz.* a collection of several particular numbers that are joined and added together one after another, for this supposes that these particulars are all known and determined; whereas the terms of an infinite series cannot be all separately assigned, there being no end in the numeration of its parts, and therefore it can have no sum in sense. But again, if we consider that the idea of an infinite series consists of two parts, *viz.* the idea of something positive and determined, in so far as we conceive the series to be actually carried on; and the idea of an inexhaustible remainder still behind, or an endless addition of terms that can be made to it one after another; which is as different from the idea of a finite series as two things can be: hence we may conceive it as a whole of its own kind, which therefore may be said to have a total value whether that be determinable or not. Now in some infinite series this value is finite or limited; that is, a number is assignable beyond which the sum of no assignable number of terms of the series can ever reach, nor indeed ever be equal to it, yet it may approach to it in such a manner, as to want less than any assignable difference; and this we may call the value or sum of the series; not as being a number found by the common method of addition, but as being such a limitation of the value of the series, taken in all its infinite capacity, that if it were possible to add them all

one after another, the sum would be equal to this number.

Again, in other series the value has no limitation; and we may express this, by saying, the sum of the series is infinitely great; which indeed signifies no more than that it has no determinate and assignable value; and, that the series may be carried such a length as its sum, so far, shall be greater than any given number. In short, in the first case we affirm there is a sum, yet not a sum taken in the common sense; in the other case we plainly deny a determinate sum in any sense.

Theorem I. In an infinite series of numbers, increasing by an equal difference or ratio (that is, an arithmetical or geometrical encreasing progression) from a given number, a term may be found greater than any assignable number.

Hence, if the series encrease by differences that continually encrease, or by ratios that continually encrease, comparing each term to the preceding, it is manifest that the same thing must be true, as if the differences or ratios continued equal.

Theorem II. In a series decreasing in infinitum in a given ratio, we can find a term less than any assignable fraction. Hence, if the terms decrease, so as the ratios of each term to the preceding do also continually decrease, then the same thing is also true, as when they continue equal.

Theor. III. The sum of an infinite series of numbers all equal, or encreasing continually, by whatever differences or ratios, is infinitely great; that is, such a series has no determinate sum, but grows so as to exceed any assignable number.

Demonst. 1. If the terms are all equal, as $A : A : A$, &c. then the sum of any finite number of them is the product of A by that number, as $A n$; but the greater n is, the greater is $A n$; and we can take n greater than any assignable number, therefore $A n$ will be still greater than any assignable number.

Secondly, suppose the series encreases continually, (whether it do so infinitely or limitedly) then its sum must be infinitely great, because it would be so if the terms continued all equal, and therefore will be more so, since they encrease. But if we suppose the series encreases infinitely, either by equal ratios or differences, or by increasing differences or ratios

ratios of each term to the preceding ; then the reason of the sums being infinite will appear from the first theorem ; for in such a series, a term can be found greater than any assignable number, and much more therefore the sum of that and all the preceding.

Theor. IV. The sum of an infinite series of numbers decreasing in the same ratio is a finite number ; equal to the quote arising from the division of the product of the ratio and first term, by the ratio less by unity ; that is, the sum of an assignable number of terms of the series can ever be equal to that quote ; and yet no number less than it, is equal to the value of the series, or to what we can actually determine in it ; so that we can carry the series so far, that the sum shall want of this quote less than any assignable difference.

Demonst. To whatever assigned number of terms the series is carried, it is so far finite ; and if the greatest term is l , the least A , and the ratio r , then the sum is $S = \frac{rl - A}{r - 1}$. See *Geo. PROGRESSION*.

Now, in a decreasing series from l , the more terms we actually raise, the last of them, A becomes the lesser, and the lesser A be, $rl - A$ is the greater, and so also is $\frac{rl - A}{r - 1}$: but $rl - A$ being still less than rl , therefore $\frac{rl - A}{r - 1}$ is still less than $\frac{rl}{r - 1}$, that is, the sum of any assignable number of terms of the series is still less than the quote mentioned, which is $\frac{rl}{r - 1}$, and this is the first part of the theorem.

Again : The series may be actually continued so far, that $\frac{rl - A}{r - 1}$ shall want of $\frac{rl}{r - 1}$ less than any assignable difference ; for, as the series goes on, A becomes less and less in a certain ratio, and so the series may be actually continued till A becomes less than any assignable number, (by Theorem. II.) now $\frac{rl}{r - 1} - \frac{rl - A}{r - 1} = \frac{A}{r - 1}$, and $\frac{A}{r - 1}$ is less than A ; therefore let any number assigned be called N , we can carry the series so far till the last term A be less than N ; and because $\frac{rl - A}{r - 1}$ wants of

$\frac{rl}{r - 1}$, the difference $\frac{A}{r - 1}$, which is less than A , which is also less than N , therefore the second part of the theorem is also true, and $\frac{rl}{r - 1}$ is the true value of the series.

Scholium. The sense in which $\frac{rl}{r - 1}$ is

called the sum of the series, has been sufficiently explained ; to which, however, we shall add this ; that whatever consequences follow from the supposition of

$\frac{rl}{r - 1}$ being the true and adequate value

of the series taken in all its infinite capacity, as if the whole were actually determined and added together, can never be the occasion of any assignable error in any operation or demonstration where it is used in that sense ; because if it is said that it exceeds that adequate value, yet it is demonstrated that this excess must be less than any assignable difference, which is in effect no difference, and so the consequent error will be in effect no error : for if any error can hap-

pen from $\frac{rl}{r - 1}$ being greater than it

ought to be, to represent the complete value of the infinite series, that error depends upon the excess of $\frac{rl}{r - 1}$ over that

complete value ; but this excess being unassignable, that consequent error must be so too ; because still the less the excess is, the less will the error be that depends upon it. And for this reason we may

justly enough look upon $\frac{rl}{r - 1}$ as expres-

sing the adequate value of the infinite series. But we are farther satisfied of the reasonableness of this, by finding in fact, that a finite quantity does actually convert into an infinite series, which happens in the case of infinite decimals. For example, $\frac{2}{3} = .6666$, &c. which

is plainly a geometrical series from $\frac{6}{10}$ in

the continual ratio of 10 to 1 ; for it is $\frac{6}{10} + \frac{6}{100} + \frac{6}{1000} + \frac{6}{10000}$, &c.

And reverely ; if we take this series, and find its sum by the preceding theorem, it comes to the same $\frac{2}{3}$; for $l =$

$\frac{6}{10}, r=10$, therefore $rl=\frac{60}{10}=6$; and
 $r-1=9$; whence $\frac{rl}{r-1}=\frac{6}{9}=\frac{2}{3}$.

We have added here a table of all the varieties of determined problems of infinite, decreasing, geometrical progressions,

which all depend upon these three things, viz. the greatest term l , the ratio r , and the sum S ; by any two of which the remaining one may be found: to which we have added some other problems, wherein $S=L$ is considered as a thing distinct by itself, that is, without considering S and L separately.

Given Sought			Solutions	
rl	s	$s=\frac{rl}{r-1}$	Or supposing the ratio $\frac{a}{b}$ to be M , whereby the ratio is $\frac{L}{M}$ then is	$s=\frac{a}{a-b}$ of $l=\frac{l^2}{l-M}$
rs	l	$l=\frac{s \times r-1}{r}$		$l=\frac{a-b}{a}$ of $s=\frac{l-M \times s}{l}$
ls	r	$r=\frac{l}{s-l}$		$s-l=\frac{b}{a-b}$ of $l=\frac{Ml}{l-M}$
lr	$s-l$	$s-l=\frac{l}{r-1}$		$s-l=\frac{b}{a}$ of $s=\frac{Ms}{l}$
sr	$s-l$	$s-l=\frac{s}{r}$		$s=\frac{a}{b}$ of $s-l=\frac{l \times s-l}{M}$
$r, s-l$	s, l	$\left\{ \begin{array}{l} s=s-l \times r \\ l=s-l \times r-1 \end{array} \right\}$		$l=\frac{a-b}{b}$ of $s-l=\frac{l-M \times s-l}{M}$

Theorem V. In the arithmetic progression 1, 2, 3, 4, &c. the sum is to the product of the last term, by the number of terms, that is, to the square of the last term; in a ratio always greater than 1:2, but approaching infinitely near it. But if the arithmetical series begins with 0, thus, 0, 1, 2, 3, 4, &c. then the sum is to the product of the last term, by the number of terms, exactly in every step as 1 to 2.

Theorem VI. Take the natural progression beginning with 0, thus, 0, 1, 2, 3, &c. and take the squares of any the like powers of the former series; as the squares, 0, 1, 4, 9, &c. or cubes, 0, 1, 8, 27; and then again take the sum of the series of powers to any number of terms, and also multiply the last of the terms summed by the number of terms, (reckoning always 0 for the first term;) the ratio of that sum, to that product is

more than $\frac{1}{n \times 1}$ (n being the index of the powers) that is, in the series of squares it is more than $\frac{1}{2}$; in the cubes more than $\frac{1}{3}$; and so on: but the series going on in infinitum, we may take in more and more terms without end into the sum; and the more we take, the ratio

of the sum to the product mentioned grows less and less; yet so as it never can actually be equal to $\frac{1}{n \times 1}$ but approaches

infinitely near to it, or within less than any assignable difference.

SERIPHUM, in botany, a genus of the syngenesia-polygamia-necessaria class of plants; the calyx is a double perianthium, each of which consists of five leaves: the exterior leaves are roundish and imbricated; the interior ones are erect, acuminate, oval-shaped, membranaceous, and very smooth: the corolla is a single funnel-shaped leaf, shorter than the inner cup: there is no pericarpium; the seed, which is single and oblong, is lodged in the cup.

SEROSITY, in medicine, denotes an overabundance of serum. See the articles **SERUM** and **BLOOD**.

SERPA, a town of Portugal, in the province of Alentejo, situated on the east-side of the river Guadiana, a west longitude $8^{\circ} 20'$, north latitude $37^{\circ} 45'$.

SERPENS, in astronomy, a constellation of the northern hemisphere; consisting of seventeen stars, according to Ptolemy; of nineteen, according to Tycho; and of fifty-

fifty-nine, in the britannic Catalogue. **SERPENT**, *serpens*, in zoology, a general term for all amphibious animals without legs. See the article **AMPHIBIOUS**.

Mr. Ray defines serpents to be creatures breathing by means of lungs; having only one ventricle in the heart, having no feet, and having a long body, covered with scales. To which he adds, that in cold seasons they can bear hunger a long time. The greater part of the serpent class are poisonous, and dangerous in their bite, leaving a mischievous liquor in the wound made by their tooth, which mixing by this means immediately with the blood, is of fatal consequence; though the whole creature may be eaten with safety, or even the poisonous liquor, which does this mischief in the wound, tasted without hurt.

Notwithstanding that serpents respire by means of lungs, they do not take in and discharge their breath by such short intervals as other animals, but what they have once inspired will serve them a long time; for as they are of a cold nature, and their naturally necessary vital warmth very small, they do not require such an eternally renewed supply of that pabulum of vital heat, as those which have more of it; and as with us they lie half the year torpid, and half dead, their vital warmth at that time, like fire smothered under ashes, barely exists, and needs perhaps no more air than what the creature took in at one inspiration, before its laying itself down for the season, which serves it till the life-renewing spring returns.

Serpents, according to Mr. Ray, may be divided into the poisonous and the harmless; the first having long dentes exerti, with poisonous liquors contained at their bottom, which on biting they discharge into the wound; the others wanting these teeth, and this poison.

They may also be divided, in regard to their generation, into the oviparous and viviparous; but this is a less firmly founded distinction than may be supposed, since all serpents are truly and properly produced of eggs; and the only difference is, that some deposit their eggs in dung-hills, and the like places, to be hatched by accidental heat; while others retain those eggs to be hatched in their own bodies, and so bring forth living young ones. Of the first kind is the common snake, of the latter the viper.

This series of animals comprehends several

distinct genera; as the amphibæna, anguis, coluber, cenchris, and crotalophorus. See the articles **AMPHIBÆNA**, **ANGUIS**, &c.

Sea-SERPENT, *serpens marinus*, in ichthyology, a name given to several species of muræna. See the article **MURÆNA**.

SERPENT'S-TONGUES, a name by which some call the glossopetræ. See the article **GLOSSOPETRA**.

SERPENTARIA, **SNAKE-ROOT**, in botany and pharmacy, the name of a species of aristolochia, or birthwort, with auriculated leaves. See **BIRTHWORT**.

The virginian snake-root obtained its name, as being accounted a specific against venomous bites: but whatever truth there may be in that, it is undoubtedly an excellent diuretic, diaphoretic, and alexipharmic medicine, and, consequently, good in inflammatory and malignant fevers: it is also a powerful antiseptic, and its dose is from four to ten or fifteen grains, in powder.

SERPENTARIUS, in astronomy, a constellation of the northern hemisphere; consisting, according to different authors, of 25, 29, or even 69 stars.

SERPENTINE, in general, denotes any thing that resembles a serpent: hence, the worm or pipe of a still, twisted in a spiral manner, is termed a *serpentine worm*.

SERPENTINE COLUMN. See **COLUMN**.

SERPENTINE MARBLE, *ophites*, a species of marble, so called from its being variegated with streaks and spots like the skin of a serpent. See **MARBLE**.

SERPENTINE VERSES, such as begin and end with the same words.

SERPIGO, in medicine, a species of herpes. See the article **HERPES**.

SERRATED, in general, something indented, or notched, in the manner of a saw; a term much used in the description of the leaves of plants, which are said to be duplicately serrated, when the edges of the large serratures are again serrated with lesser indentings of the same kind.

SERRATULA, **SAW-WORT**, in botany, a genus of the syngenesia-polygamia-æqualis class of plants, the compound flower of which is tubulose and uniform; and the partial ones are monopetalous, infundibuliform, and quinquefid at the limb: the stamina are five very short capillary filaments: the seeds are solitary, crowned with down, and contained in the cup,

SERPA,

SERPA, a town of Portugal, in the province of Alentejo, west long. $8^{\circ} 20'$, north lat. $37^{\circ} 45'$.

SERRATUS, in anatomy, a name given to several muscles from their resemblance to a saw: as, 1. The serratus major anticus, which arises by dentated origins from the six lower true ribs, and from one, or sometimes two, of the upper spurious ones. 2. The serratus minor anticus, called also the pectoralis minor, which arises from the second, third, and fourth true ribs, continues its course under the pectoralis magnus, and is inserted into the caracoid process of the scapula: these two serve to move the scapula forward and downward, and many anatomical writers have referred them to the number of the elevators of the ribs. 3. The serratus pectus superior, which arises with a thin and broad tendon, from the two lower vertebræ of the neck, and the two upper ones of the back; and terminates in the second, third, and fourth ribs. 4. The serratus pectus inferior, which arises with a broad tendon from the three lower vertebræ of the back, and the two upper ones of the loins; it terminates in the four inferior spurious ribs, and surrounds the extensors of the back, in the manner of a vagina, to prevent their fibres from separating one from another, as they might otherwise do in violent motions: these two last contribute to respiration.

SERTULARIA, in botany, a genus of the cryptogamia-lithophytorum of Linnæus, and the same with the coralline of Tournefort. See CORALLINE.

SERVANT, a term of relation signifying a person who owes and pays a limited obedience for a certain time, to another in quality of master.

If any servant, who is hired for a year, depart before the end of his term, without reasonable cause, to be allowed by a justice of the peace; or after the term is expired, without giving a quarter's warning, he is liable to be committed to prison by two justices, till he gives security to serve out the time; or he may by one justice be sent to the house of correction, there to be punished as a disorderly person, 7 Jac. I. c. 4. On the other hand, a master cannot put away his servant before the end of the term he was hired for, without some reasonable cause allowed by a justice of the peace; nor after the expiration of the term without a quarter's warning given, on pain

of forfeiting 40 s. Where a servant is hired for a year happens to fall sick such servant ought not to be discharged nor his wages abated on that account. It is held, that if one being a creditor sends his servant for money, to whom is paid, this will be a good payment and discharge, though the servant does not bring the money to his master. It has been adjudged, that where a servant usually buys goods for his master upon credit, and takes up things in his name though it be for his own use, the master is liable: nevertheless it is not so where the master usually gives him ready money. Where the master gives his servant money to buy goods for him, and he converts the money to his own particular use, and at the same time buys thereupon credit, the master is answerable where such goods came into his own possession.

SERVETISTS, a name given to the modern antitrinitarians, from their being supposed to be the followers of Michael Servetus, who, in the year 1559, was burnt at Geneva, together with his books.

SERVIA, a province of european Turkey bounded by the Save and the Danube on the north; by Bulgaria, on the east by Albania and Macedon, on the south and by Bosnia and Dalmatia, on the west.

SERVICE, in law, is a duty which a tenant, on account of his fee, owes to his lord.

There are many divisions of services, as 1. Into personal, where something is to be done by the tenant in person, as homage and fealty. 2. Real, such as wards, marriages, &c. 3. Accidental, including heriots, reliefs, and the like. 4. Intire, where, on the alienation of any part of the lands by a tenant, the services become multiplied. 5. Frank-service, which was performed by freemen, who were not obliged to perform any base service, but only to find a man and horse to attend the lord into the army, or to court. 6. Knight's service, by which lands were antiently held of the king, on paying homage, service in war, &c. 7. The rights and prerogatives, which within certain manors belong to the lords thereof by the king's grants, such as the power of judicature in matters of property, and in felonies and murders; minting of money, assize of bread, beer, weights and measures, assessments, &c.

SERVITES,

SERVITES, a religious order in the church of Rome, founded about the year 1233, by seven-florentine merchants, who with the approbation of the bishop of Florence renounced the world, and lived together in a religious community on mount Senar, two leagues from that city. It is pretended, that when they first appeared in the black habit given them by the bishop, the very children at the breast cried out, *see the servants of the Virgin*, and that this miracle determined them to take no other name but servites, or servants of the Virgin. This order became very numerous.

There are also nuns of this order, who have several monasteries in Germany, Italy, and Flanders.

SERVITOR, in the university of Oxford, a student who attends on another for his maintenance and learning.

SERVITORS of bills, servants or messengers of the marshal of the king's bench, sent with bills or writs, to summon people to that court: these are now called tip-staves.

SERVITUDE, the condition of a servant, or rather slave. See the articles **SERVANT** and **SLAVE**.

SERUM, a thin, transparent, saltish liquor, which makes a considerable part in the mass of blood. See *Analysis of the BLOOD*. The serum is in reality the same with the lymph, which is carried by the arteries through the several parts of the body; whence it returns partly in the veins, and partly in the lymphatic vessels. See the article **LYMPH**.

Sweat and urine are nothing but serum drained of their nutritious parts, by repeated circulations, and secreted from the blood in the glands of the skin and kidneys.

SESAMOIDA OSSA, in anatomy, several small bones that somewhat resemble the seed of the sesamum, whence their name. Their most usual situation is, 1. In the thumb or great toe; in each of which we often find two of them, though not unfrequently only one. 2. One in the juncture of the metacarpus with the little finger: this is frequently lodged in the muscle of that finger. 3. One frequently in each external condyle of the os femoris. One under the os cuboides of the tarsus, in the tendon of the peronæus posticus. These are usually found in adults, or in elderly people. Sometimes, though more rarely, there is also one in

the internal condyle of the os femoris; and sometimes there is one in the external surface of the os metacarpi, which sustains the fore-finger, lodged in the tendon of the adductor muscle of the index. Upon the whole, says Heister, there are very rarely found more than sixteen of them; those anatomists, therefore, err greatly, who place two at the articulation of each finger and toe.

The size and shape of these bones are various and irregular: they are cartilaginous in young subjects, but grow hard and bony by age. They serve as a kind of trochleæ to the muscles, and increase their power.

SESAMUM, the **OILY GRAIN PLANT**, in botany, a genus of the didynamia-angiospermia class of plants, the corolla whereof consists of a ringent petal; the tube is roundish, and almost the length of the cup; the faux is inflated, patent, and very large; the limb is quinquifid; the fruit consists of an oblong quadrangular capsule, compressed, acuminate and quadrilocular: the seeds are numerous and roundish.

The seeds of this plant, upon expression, yield a larger quantity of oil than almost any other known vegetable; among the Indians they are used as food.

SESELI, **DUTCH SAXIFRAGE**, in botany, a genus of the pentandria-digynia class of plants, the general corolla of which is uniform; the single flowers are composed each of five inflexo-cordate and slightly unequal petals; the fruit is naked, oval, small, striated, and separable into two parts; the seeds are two, oval, convex, and striated on one side, and plane on the other.

SESQUI, a latin particle, signifying a whole and a half, which joined with *altera*, *terza*, *quarta*, &c. is much used in the italian music to express a kind of ratios, particularly several species of triples. See the article **TRIPLE**.

The ratio expressed by sesqui is the second ratio of inequality, called also super-particular ratio, and is when the greater term contains the less once, and some certain part over, as 3 : 2, where the first term contains the second once, and unity over, which is a quota part of 2. Now if the part remaining be just half the less term, the ratio is called sesqui-altera; if it be a third part of the less term, as 4 : 3, the ratio is called sesqui-terza, or tertia; if a fourth, as 5 : 4,

the

the ratio is sesqui-quarta, and thus to infinity, still adding to sesqui the ordinal number of the less term. In English we sometimes say, sesqui-alteral, sesqui-third, fourth, &c. As to the kinds of triples expressed by the particle sesqui, they are these, the greater perfect sesqui-alteral, *sesqui-altera maggiore, perfetta*, which is a triple where the breve is three minims, and that without having any point or dot annexed to it. The greater imperfect sesqui-alteral, which is where the breve when pointed contains three minims, and that without any point, only two. The less perfect sesqui-alteral, is where the semi-breve contains three minims, and that without any point. The less imperfect sesqui-alteral is a triple where the semi-breve with a point contains three minims, and two without. According to Buontempi, one may likewise call the triples $\frac{9}{4}$ and $\frac{12}{8}$ sesqui-alterals. See the article PROPORTION.

Sesqui-octave is a kind of triple marked $C \frac{8}{3}$, called by the Italians *nonupla di crome*, where there are nine quavers in every bar, whereof eight are required in common time. The double sesqui-fourth, or sesqui-quarta dupla, marked thus, $C \frac{8}{4}$, called by the Italians *nonupla di semiminime*, is where there are nine crotchets in a bar instead of four, in common time. Sesqui-terza, the triples $\frac{9}{8}$, and $\frac{12}{10}$, says Buontempi, may be thus denominated. Sesqui-ditone is a concord resulting from the sound of two strings whose vibrations in equal time are to each other as 5 : 6. See the article DITONE, VIBRATION, CHARACTER, &c.

SESQUI-ALTERAL PROPORTION, in geometry and arithmetic, is when any number or quantity contains another once and an half, and the number so contained in the greater, is said to be to it in subsequi alteral proportion. See the article PROPORTION.

SESQUI-DUPLICATE PROPORTION, is when of two terms the greater contains the less twice, with half another over.

SESQUI-QUADRATE, an aspect or position of the planets, when they are at the distance of four signs and an half, or 135 degrees from each other; and sesqui-quintile is an aspect of the planets when they are 108 degrees from each other.

SESQUI-TERTIONAL PROPORTION, is when any number or quantity contains another once and one third.

SESSA, a town of Italy, in the kingdom

of Naples, and territory of Lavoro, situated a little west of the Tuscan sea, twenty-four miles north of Naples.

SESSILE ROOTS, among botanists, such tuberos roots as adhere to the base of the stalk. And a sessile leaf expresses a leaf immediately fixed to the stalk or root without any petiole.

SESSION, *sessio*, in general, denotes each sitting or assembly of a council, &c.

SESSION of parliament, is the season or space from its meeting to its prorogation. See the article PARLIAMENT.

Kirk-SESSIONS. See KIRK-SESSIONS.

SESSION for weights and measures, is a London taken for a sitting of four justices chosen from among the mayor, recorder and aldermen, who hold a court in order to inquire into offences of persons selling by false weights and measure contrary to the statutes, and to punish the same.

SESSION, in law, denotes a sitting of justices in court upon their commission; and the sessions ofoyer and terminer, the quarter sessions, otherwise called the general or open sessions of the peace, in opposition to what is called a privy session, held upon special occasions for speedy dispatch of justice. This general session of the peace is a court of record held before two or more justices, one being of the quorum, for the execution of the authority granted them by their commission and particular statutes, whereby they are authorized to hear and determine trespasses against the public peace &c. and likewise divers offences by statute. This court of sessions is held four times a year in every county. See the article COURT, &c.

SESTERCE, *sestertius*, a silver coin in use among the Romans. See COIN.

Some authors make two kinds of sesterces, the less, called sestertius, in the masculine gender, and the great one, called sestertium, in the neuter, the latter containing a thousand of the other. See the article MONEY.

Others will have any such distinction great and little sesterces unknown to the Romans; sestertius, say they, was an adjective, and signified as *sestertius*, or a thousand and an half, and when used particularly, as in *quinquaginta sestertium*, sestertia, it was only by way of abbreviation, and there was always understood millia, or thousands.

Sesterce, or sestertius, was also used

the antients for a thing containing two wholes and an half of another, as *as* was taken for any whole or integer. See the article *As*.

SESTOS, a noted fortress of european Turkey, situated at the entrance of the Hellespont or Dardanells, twenty-four miles south-west of Gallipoli.

SESTUPLO, in music. See **SEXTUPLE**.

SET, or **SETS**, a term used by the farmers and gardeners to exprels the young plants of the white thorn and other shrubs, with which they use to raise their quick or quickset hedges. See the articles **HEDGE** and **OFF-SETS**.

SET-BOLTS, in a ship. See **BOLT**.

SETHIANS, in church-history, christian heretics, so called because they paid divine worship to Seth, whom they looked upon to be Jesus Christ the son of God, but who was made by a third divinity, and substituted in the room of the two families of Abel and Cain, which had been destroyed by the deluge. These heretics appeared in Egypt in the second century, and as they were addicted to all sorts of debauchery, they did not want for followers, and continued in Egypt above two hundred years.

SETIMO, a town of Italy in the province of Piedmont, situated on the river Po, eight miles north of Turin.

SETON, in surgery, a few horse-hairs, small threads, or large packthread drawn through the skin, chiefly the neck, by means of a large needle or probe, with a view to restore or preserve health.

There are chiefly three methods of performing this operation practised among surgeons. The first is by taking up the skin in the lower part of the neck, and introducing a needle armed with silk or thread through the skin, which is to be left in the neck after the needle is removed; the wound is then dressed with some digestive ointment, and covered with a plaster perforated on each side for the ligature to pass through; the ligature is to be shifted or drawn through the wound a little every day, and the matter is to be wiped off, by which means it will degenerate into an ulcer with a double orifice, making a copious discharge daily; and when one ligature is become foul and unfit for use, another may be introduced by fastening it to the end of the old one. The second way of making a seton differs little from the former; only instead of a large needle, a double-edged scalpel is made use of, by means of which

a larger aperture is made, and a greater quantity of matter is thereby discharged. The third manner is by an instrument for the purpose, whereby the skin is pinched up, and afterwards perforated with a sharp-pointed and red-hot iron, after which the ligature is introduced. We find by experience, that setons are very useful in the hydrocephalus, catarrhs, inflammations and other disorders, particularly those of the eyes, as a gutta serena, catara&t, and incipient suffusion; to those we may add intense headachs, with stupidity, drowsiness, epilepsies, and even an apoplexy itself.

SETTE, in geography, the same with *Cette*. See the article *CETTE*.

SETTE, a vessel very common in the Mediterranean, with one deck, and a very long and sharp prow; they carry some two masts, some three, without top-masts. Their yards and sails are all like the mizen; the least of them are of sixty tons burden: they serve to transport cannon and provision for ships of war, and the like.

SETTER, among farmers. To setter is to cut the dewlap of an ox or cow, and into the wound to put the root of the helleboraster, whereby an issue is made for ill humours to vent themselves.

SETTING, in astronomy, the withdrawing of a star or planet, or its sinking below the horizon. Astronomers and poets make three different kinds of setting of the stars, *viz.* the cosmical, acronychal, and helical. See the articles **COSMICAL**, **ACRONYCHAL**, **HELICAL**, and **RISING**.

SETTING,* in the sea language. To let the land or the sun, by the compass, is to observe how the land bears on any point of the compass, or on what point of the compass the sun is. Also when two ships sail in sight of one another, to mark on what point the chased bears, is termed setting the chase by the compass.

SETTING, among sportsmen, a term used to exprels the manner of taking partridges by means of a dog peculiarly trained to that purpose.

The setting-dog generally used is a long land-spaniel, taught by nature to hunt partridges more than any other game, and in his untaught state running over the fields in search of them; but being taught, the creature is under such excellent command, that he will, in the midst of his highest career, attend the least hem from his master, and stands still to look in his face and to take his or-

ders by the slightest signals; and when he is so near his game that it is almost in his mouth, he will stand stock-still, or lye down on his belly, till his master arrives, and he receives his directions. The setting-dog being taken to the haunt of the partridges, is to be cast off, and sent to range; but he must be made to keep near the sportsman, and not to run wildly on, but to beat all the ground regularly. If in the dog's ranging he stops on a sudden, the sportsman is to make up to him, and as there is certainly game before him, he must be ordered to advance; if he refuses this, and looks back and shakes his tail, it is a signal that they are close before him, and the sportsman is then to take a circumference, and look carefully before the dog's nose, to see where they are, and how they lie; then going up and staking down one end of the net, he is to command the dog to lie still, and to draw the net gently over the birds, then making in with a noise, he is to spring them, and they will be entangled and taken, as they rise.

SETTLE, a market-town in the west riding of Yorkshire, situated forty-five miles west of York.

SEVENOAK, a market-town of Kent, fourteen miles west of Maidstone.

SEVENTH, *septima*, in music, an interval called by the Greeks heptachordon, whereof there are four kinds; first, the defective seventh, consisting of three tones and three greater semitones; the second, called by Zarlino and the Italians demiditono con diapente, or settimo minore, is composed diatonically of seven degrees and six intervals, four whereof are tones, and the rest greater semi tones, and chromatically of ten semi-tones, six whereof are greater, and four less; it takes its form from the ratio quadruparziante quinto, as 9 : 5. The third, called by the Italians il ditono con diapente, or settimo maggiore, is composed diatonically of seven degrees, like the former, and six intervals; five whereof are tones and a major semi-tone, so that only a major semi-tone is wanting to make up the octave, and chromatically of twelve semi-tones, six greater and six less. It takes its form from the ratio of 15 : 8. The fourth is redundant, and composed of five tones, a greater semi-tone and a less, so that it wants only a comma of an octave, and is, so much as to make its second semi-tone greater, called pentatonon. Hence

many confound it with the octave, maintaining with good reason, that only three first sevenths can be of any use.

SEVER, a town of France, in the province of Gascony, situated on the river Adour, thirty-eight miles north-east Bayonne.

SEVERAL, a term much used in law, thus several action, signifies an action wherein two or more are severally charged. See the article **ACTION**.

Several covenant, that entered into by two or more persons severally. Any such covenant, though contained in one deed or writing, is deemed as several deeds, wrote on the same piece of paper or parchment. See **COVENANT**.

Several inheritance, is when an inheritance is conveyed so as to descend to two persons severally by moieties, &c. See the article **INHERITANCE**.

Several tail, signifies that estate or land which is intailed severally on two; where lands are given to two men and their wives, and to the heirs of the bodies to be lawfully begotten, in which case the donees hold jointly for their two lives, and at the same time have a several or separate inheritance: for the issue of the one shall have his moiety in tail, and the issue of the other his. See **TAIL**. Several tenancy, is a plea or exception to a writ which is taken out against two persons as joint-tenants, who in fact are several.

SEVERANCE, in law, the singling or separating of two or more joined in one writ. According to Hale there are two kinds of severances, one where a plaintiff will not appear, and the other where several plaintiffs appear, but some of them will not proceed in the suit. Severance is allowed as well in real as in personal actions. There is a severance of joint tenants in assize, which is where one of two disseises appear upon the writ, and not the other. There is also severance in debt, as where two or more executors are plaintiffs in a suit, and one of them refuses to prosecute. Likewise if in a writ of error there are several plaintiffs and the one only assigns errors, or in case the other release the same, this will not be good without summoning and severing the rest. Where there is a severance of joint tenants, in such case the prosecution of the suit is severed, but not the estate in the lands, &c. And upon suing out a writ of summons and severance, if the party does not come in thereon, the other

other shall have judgment *ad prosecutionem solum*, to prosecute alone, which may be done in the court of king's bench by giving a rule, &c.

SEVERANCE of corn, signifies the cutting and carrying the same off the ground; and sometimes it is taken for the setting out the tithe from the rest of the corn.

SEVERINO ST. a city of Naples, in the province of Calabria, situated east long. $17^{\circ} 30'$, north lat. $39^{\circ} 16'$. This is also the name of a town in the pope's territories and marquise of Ancona, situated twenty miles south-east of Loretto.

SEVERN, a river of South-Britain, which rising in Montgomeryshire; runs east till it enters Shropshire; and having passed by Shrewsbury turns south, and discharges itself into the Bristol-channel.

SEVERIO, a town of Italy, in the kingdom of Naples, and territory of Capitanat: situated in east long. $16^{\circ} 12'$, north lat. $41^{\circ} 32'$.

SEVILLE, a city of Spain, capital of the province of Andalusia, situated on the river Guadalquivir, in west long. 6° , north lat. $37^{\circ} 15'$.

SEVOLD, or **SEGWOLD**, a town of Livonia, situated thirty miles north-east of Riga.

SEVUM, or **SEBUM**, **SUET**, in anatomy, See the article **SUET**.

SEWER, in the household, an officer who comes in before the meat of a king or nobleman, to place and range it on the table.

SEWER is also a passage or gutter made to carry water into the sea or a river, whereby to preserve the land, &c. from inundations and other annoyances. The business of the commissioners of sewers, or their office in particular, is to repair sea-banks and walls, survey rivers, public streams, ditches, &c. and to make orders for that purpose. See the article **COMMISSION**.

These commissioners have likewise authority to make enquiry of all nuisances or offences committed by the stopping of rivers, erecting mills, not repairing banks, bridges, &c. and to tax persons chargeable for the amending of defaults that tend to the obstruction or hindrance of the free passage of the water through its antient courses. They may not only make a rate and assessment for repairs, but also may decree lands to be sold, in order to levy charges assessed, upon non-payment thereof, &c. But the decrees of the commissioners are to be certified

into chancery, and have the king's assent to be binding, and their proceedings are subject to the jurisdiction of the king's bench. In the making of a rate or tax, the commissioners are to assess every owner or possessor of lands in danger of receiving any damage by the waters, equally according to the quality of their lands, rents, and numbers of acres, and their respective portions and profits, whether it be of pasture, fishing, &c. And where no persons or lands can be known that are liable to make repairs of banks and sewers, then the commissioners are to rate the whole level. The 3. Jac. I. ordains that all ditches, banks, bridges, and water-houses, within two miles of London, adjoining to, and falling into the Thames, shall be subject to the commissioners of sewers. Also the lord mayor, &c. may appoint persons in that case to have the power of commissioners of sewers. Persons breaking down sea-banks, whereby lands are damaged, are adjudged to be guilty of felony; and removing piles, &c. forfeit twenty pounds, by 6 and 10 Geo. II. c. 31.

SEX, *sexus*, something in the body which distinguishes male from female.

SEXAGENARY, something relating to the number sixty: thus sexagenary or sexagesimal arithmetic, is a method of computation proceeding by sixties; such is that used in the division of a degree into sixty minutes, of the minute into sixty seconds, of the second into sixty thirds, &c. Also sexagenary tables are tables of proportional parts, shewing the product of two sexagenaries that are to be multiplied, or the quotient of the two that are to be divided.

SEXAGESIMA, the second Sunday before Lent, or the next to Shrove-Sunday, so called as being about the sixtieth day before Easter.

SEXAGESIMALS, or **SEXAGESIMAL-FRACTIONS**, fractions whose denominators proceed in a sexagecuple ratio; that is, a prime, or the first minute $= \frac{1}{60}$; a second $= \frac{1}{3600}$; a third $= \frac{1}{216000}$. Antiently there were no other than sexagesimals used in astronomy, and they are still retained in many cases, though decimal arithmetic begins to grow in use now in astronomical calculations. In these fractions, which some call astronomical fractions, the denominator being always sixty, or a multiple thereof, is usually omitted, and the numerator only written down, thus, 4° , $59'$, $32''$, $50'''$, $16''''$,

is to be read four degrees, fifty-nine minutes, thirty-two seconds, fifty thirds, sixteen fourths, &c.

SEXANGLE, in geometry, a figure having six sides, and consequently six angles.

SEXTANS, *sextant*, a sixth part of certain things. The Romans having divided their *as* into twelve ounces, or *uncia*, the sixth part of that, or two ounces, was the sextans.

Sextans was also a measure which contained two ounces of liquor, or two cyathi. See the article **MEASURE**.

SEXTANT, in mathematics, denotes the sixth part of a circle, or an arch comprehending sixty degrees. See **CIRCLE**. The word sextant is more particularly used for an astronomical instrument made like a quadrant, excepting that its limb only comprehends sixty degrees. The use and application of the sextant is the same with that of the quadrant. See the article **QUADRANT**.

SEXTARIUS, an antient roman measure. See the article **MEASURE**.

SEXTERY LANDS, signifies lands formerly given to a church, or religious house, for the maintenance of a sexton. See the article **SEXTON**.

SEXTILE, *sextilis*, the position or aspect of two planets when at sixty degrees distance, or at the distance of two signs from one another. It is marked thus (*). See the article **ASPECT**.

SEXTON, a church-officer, whose business is to take care of the vessels, vestments, &c. belonging to the church, and to attend the minister, church-wardens, &c. at church. He is usually chosen by the parson only. The office of sexton, in the pope's chapel, is appropriated to the order of the hermits of St. Augustine. He is generally a bishop, though sometimes the pope only gives a bishopric in particular to him on whom he confers the post: he takes the title of prefect of the pope's sacristy, and has the keeping of the vessels of gold and silver, the relics, &c. When the pope says mass the sexton always tastes the bread and wine first. If it be in private he says mass, his holiness of two wafers gives him one to eat; and if in public, the cardinal who assists the pope in quality of deacon, of three wafers gives him one to eat. When the pope is very sick he administers to him the sacrament of extreme unction, &c. and enters the conclave in quality of first conclavist.

SEXTUPLE, *sestuplo*, in music, denotes mixed sort of triple which is beaten double time. See the article **TRIPLE**. Authors usually make mention of the species hereof, to which Mr. Bross adds two others, five in all, which are these: sextuple of a semi-breve, called the French triple of 6 for 1, as being denoted by the numbers 6; or because here are required six semi-breves to measure instead of one, in common time three for the rising and three for the falling of the hand. Sextuple of a minim called by the French 6 for 2, as being denoted by 6, which shews that six minims must be contained in a bar, where two are sufficient in common time. Sextuple of a crotchet, called by the French triple of 6 for 4, because denoted by C 6, wherein six crotchets are contained in the bar instead of four. Sextuple of the chroma, denominated 6 for 8 by the French, as being denoted by 6, which shew that six quavers here make a bar, or semi-breve, instead of eight in common time. Sextuple of the semi-chroma, or triple of 6 for 16, so called as being denoted by the figures 6, 16, which shews that six quavers are here required to a measure instead of sixteen. See the article **TIME**, &c.

SEXUALISTÆ, among botanical writers, those who have established the classes of plants upon the differences of the sexes and parts of fructification in plants, according to the modern method, as Linnaeus, &c. See the article **BOTANY**.

SEYNE, a river of France, which rising near Dijon, in Burgundy, runs north-west through Champain and the isle of France, through Paris, &c. and crossing Normandy falls into the British-channel, between Havre-de-grace and Honfleur.

SGRAFFIT, *sgraffata*, in painting, denotes scratch work, a method of painting in black and white only, not in fresco, yet such as will bear the weather. Sgraffit performs both the design and painting all in one. It is chiefly used to embellish the fronts of palaces and other magnificent buildings.

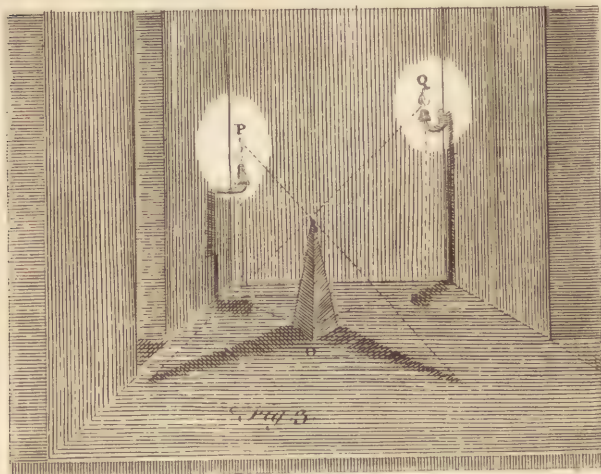
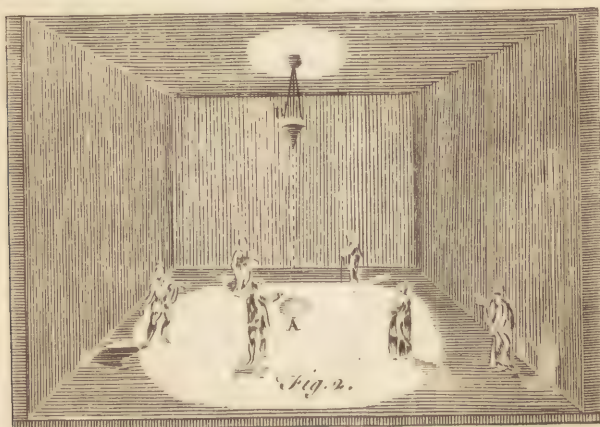
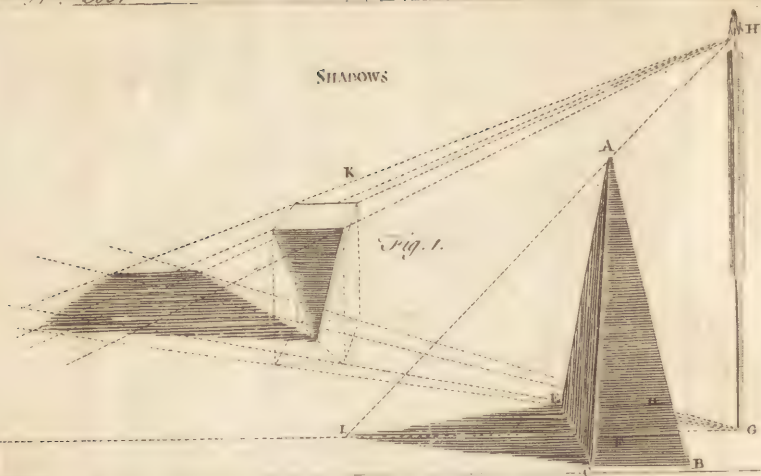
SHACK, in antient customs, a liberty of winter pasturage. In the counties of Norfolk and Suffolk, the lord of the manor has shack; that is a liberty of feeding his sheep at pleasure in his tenants' lands, during the six winter months.

SHACKLES, or **SHAKLES**. See the article **SHAKLES**.

SHAD, *alauſa*, in ichthyology, a species of



SHADOWS





with the upper jaw bifid at its tip, and spotted with black : it resembles the common herring, at account, sometimes called the herring : all the fins are except that on the back : the pectorals are forked.

Umbræ, in optics, a privation of light, by the interposition of an opaque body ; or it is a plane where the light is either altogether obstructed, or greatly weakened, by the interposition of some opaque body between it and the luminary.

A shadow of itself is invisible ; and therefore, when we say we see a shadow, we partly mean that we see bodies placed in the shadow, and illuminated by light reflected from collateral bodies ; and, partly, that we see the confines of the light. See the article **LIGHT**.

If the opaque body that projects the shadow be perpendicular to the horizon, and the place it is projected on be horizontal, the shadow is called a right shadow ; and such are the shadows of men, trees, buildings, mountains, &c. But if the opaque body be placed parallel to the horizon, the shadow is called a versed shadow ; as the arms of a man stretched out, &c.

The laws of the projection of SHADOWS from opaque bodies.

1. Every opaque body projects a shadow in the same direction with its rays ; that is, towards the part opposite to the light. Hence, as either the luminary or the body changes place, the shadow likewise changes. 2. Every opaque body projects as many shadows as there are luminaries to enlighten it : 3. As the light of the luminary is more intense, the shadow is the deeper : hence the intensity of the shadow is measured by the degrees of light that space is deprived of. 4. If a luminous sphere be equal to an opaque one it illuminates, the shadow, which this latter projects, will be a cylinder, and consequently will be propagated still equal to itself, to whatever distance the luminary is capable of acting ; so that if it be cut in any place, the plane of the section will be a circle, equal to a great circle of the opaque sphere. 5. If the luminous sphere be greater than the opaque one, the shadow will be conical. If, therefore, the shadow be cut by a plane, parallel to the base, the plane of the section will be a circle ; and that so much the less as it is at a greater distance from the base. 6. If

the luminous sphere be less than an opaque one, the shadow will be a truncated cone ; and, consequently, grows still wider and wider ; and therefore, if cut by a plane, parallel to the section, that plane will be a circle, so much the greater as it is further from the base.

Of SHADOWS from the sun. The sun being vastly larger than the whole globe of the earth, must give all its shadows pointed, by reason it illumines more than half of them.

In consequence of this demonstration, we might conclude, that all the sun's shadows must be less than the bodies that project them, and diminished more and more as they recede further and further. Now this would be true were there any relation between the body illuminated and the body illumining ; but as all objects on the earth are so small in comparison of that star, the diminution of their shadows is imperceptible to the eye, which sees them always equal ; *i. e.* either broader or narrower than the body that forms them : on this account all the shadows caused by the sun are made in parallels.

From the whole it appears, that to find the shadow of any body whatever opposed to the sun, a line must be drawn from the top of the luminary perpendicular to the place where the foot of the luminary is to be taken : and through this place an occult line is to be drawn through one of the angles of the plan of the object, and another from the sun to the same angle ; and the intersection of the two lines will shew how far the shadow is to go : all the other lines must be drawn parallel hereto.

The shadows of the sun are equal in objects of the same height, though at a distance from each other. See plate CCXLIV. fig. 3. n^o 1.

Experience teaches, that stiles, or elevations of the same height, removed to a distance from each other, do yet project equal shadows at the same time : for they are lengthening and shortening, in proportion as the sun comes nearer, or recedes further off ; one or other of which he is continually doing.

For this reason, when the shadow of an object is to be cast any way, you must determine the place of the sun, and the point underneath, to draw two occult lines from the same, for the extremity of the shadow ; as here the palisade A gives the extreme of its shadow in B : and if from

from this point B, you draw a point of sight C, this line BC will be the shadow of the palisade D, as well as that of A, and of all the rest in the same line to the very point of sight.

In effect, it must be held for a certain maxim, that shadows always retain the same point of sight as the objects. On the footing of this observation, that objects of the same height give equal shadows: if you would give the shadow of the palisades, E, F, which are of the same height as A, D, take in your compasses the distance AD, and set it on the foot of the palisade E, by which you will have EG; then from G draw a line to the point of sight C; and thus you are to proceed, let the number of walks be ever so great.

Though the sun is made to appear in this figure, it must not be supposed that he is so near the objects; the design being only to shew, that the rays proceed from him in this manner, when at such a height, though far without the limits of the piece; as *ibid.* n° 2. which yet has the line for the foot of the object AB; and those of the rays of the sun C, C, C, because these are always required for finding the extremities of the shadows.

The shadow of the object O is found by continuing the line AB, and making it rise over the steps, and against the wall, till cut by the ray in the point S, by the rays passing over the corner of the object, and from S drawing a line to the point of sight T.

To find the shadow of the object P, it must be remembered that the foot of the light must always be supposed on the plane where the object is placed. Accordingly, the ray C, cutting the little line AB, shews how far the shadow of the little object P must go, to be thence drawn to the point of sight T. The object V casts its shadow all along, though in its way it descends into a ditch.

The shadow of the wall R is found by the same rule as the rest; as appears from the lines AB and the ray C.

SHADOWS by torch-light. The shadow of an erect pyramid by torch-light falls as it would by the light of the sun; and in both cases there is but one line, whereon the vertical point of the pyramid will be found.

Upon the planes BCDE (pl. CCXLV. fig. 1.) draw the diagonals EB and DC; through the central point F, raise

the perpendicular FA; and from the four points, B, C, D, E, draw lines to the point A, and the pyramid will be erected.

Then, to find its shadow, draw an indefinite line from its basis G of the illuminating body, passing through F; and from the central flame of the torch H draw another line over the vertex of the pyramid in the line GF, till it cut the point I, which point will limit the shadow of the pyramid.

Lastly, draw a line from C to I, and another from E to I, and the triangle CIE will be the shadow of the pyramid. To gain the shadow of an inverted pyramid, draw perpendicular lines from the angular points of its base, and form the subjacent plane, by means thereof, after the manner directed for the sun.

And from all the angles of this plane draw lines to the base of the torch G; then from H, the central point of the flame, draw other lines touching all the angles of the base of the inverted pyramid, and dividing those of the plane, whereby the shadow will be defined.

Shadows from the sun are cast all the same way, and have the same disposition; it being impossible that the sun should occasion one shadow towards the east, and another towards the west, at the same time.

It is true, in different times of the day, it makes this difference; but never in one and the same hour.

But the torch, candle, and lamp, have always this effect; for in what place soever one of these luminaries be found, provided there be a number of objects about them, the shadows will be cast various ways; some to the east, some to the west, some to the north, and others to the south, according to the situation of the objects around the luminary: the foot of which, here represented by A, (*ibid.* fig. 2.) serves as a common center, from which they all proceed; and the flame; here represented by B, shews where they are to terminate, though at different distances; as the nearest produce the shortest shadows, and the remotest the longest.

SHADOWS on several parallel planes. The first plane here is the floor, whereon the chair A (plate CCXLIV. fig. 3. n° 3.) stands; the second plane is the upper part of the table, parallel to the first, and may be either above or below it. There might

might also be more of these planes, wherein to find the foot of the illuminating body, in order to come at the shadow of the object. Suppose the foot of the illuminating body to be C, and the upper flame B; from the points C and B draw lines through the upper and under parts of the object D, which will give the shadow E upon the table.

To find the shadow of the chair A, which is placed on the ground, determine the foot of the luminary on the table in C on the ground: this is easy by the following instructions. From the point of distance, which is here supposed to be without the limits of the paper, draw a line through the foot of the table F; then from the angle G upon the table let fall a perpendicular, cutting the line F in the point H, and from H draw a parallel to the base H I, which is equal to the upper part of the table, and will direct to the thing required. For drawing a line from the point of sight K, through the foot of the luminary C, to the extremity of the table L; from the same point L, let fall a perpendicular to H I, which will give the point M.

Then from M draw a line to the point of sight K, in which line M K the foot of the luminary will be found.

To determine the precise point, let fall a perpendicular from the point C, which, cutting the line M H, will give the point N for the foot of the luminary.

This point N being thus found, there will be no difficulty in finding the shadow of the chair A, the method being the same as for the other objects taught before, that is, from the foot of the luminary N draw lines through all the angles of the plane of the chair, and other lines through the upper part of the chair from the luminary B; these latter, by intersecting the former, express the bounds of the shadow. For the rest, the figure gives sufficient directions.

When two luminaries shine on the same object, two shadows must be produced; each of the luminaries occasioning its respective shadow, and that in proportion to the circumstances of the luminary.

If such luminaries, when at equal distances be equal, the shadows themselves must be equal: but if there be any disproportion, that is, if one of them be a little bigger than the other, or one of them a little nearer the object than the other, the shadows will be unequal.

Thus the object O, (pl. CCXLV. fig. 3.) being illuminated by two candles, the one near at hand in P, the other farther off in Q, it is evident the shadow of the candle P, will be deeper than that of the candle Q, as is expressed in the figure.

The rules for such shadows are the same with those already given, both for the sun and the torch.

From what has been observed before may be drawn this conclusion, that the same object may project shadows of divers forms, though still illumined on the same side; the sun giving one form, the torch another, and the day-light no precise form at all.

The sun always makes its shadow equal to the object, that is, projects it parallel-wise.

It is certainly of consequence to all painters, engravers, &c. to observe these rules precisely, and not to take the rules for candles, lamps, and the like, in lieu thereof, as is too frequently done.

The shadow of a torch or flambeau, is not projected in parallel lines, but in rays proceeding from a center, whence the shadow is never equal to the body, but always bigger, and grows more so as it recedes farther off. It appears therefore a gross abuse to represent the shadow of a torch like that of the sun, and the shadow of the sun, like that of a candle, when the difference is so considerable.

There is a third kind of shadow, neither produced by the sun nor a torch; but only a fine sunny day, which wanting strength to finish and define its form, occasions a dimness near the object. Now for this there is no certain rule, but every body conducts it at discretion.

All these shadows, both of the sun, of the torch, and of the day-light, must appear darker than the parts of objects not illumined; and that part of the shadow that is most remote from the object must be still darker than that nearer it.

SHADOW, in geography. The inhabitants of the terraqueous globe of the earth receive different denominations, according to the different ways wherein their shadows are projected; as *ascii*, *amphiscii*, *heteroscii*, and *periscii*. See the articles *ASCII*, &c.

SHADOW, in painting, an imitation of a real shadow, effected by gradually heightening and darkening the colours of such figures, as by their dispositions cannot receive any direct rays from the luminary that

that is supposed to enlighten the piece. The management of the shadows and lights makes what the painters call *claro-obscuro*. See *CLARO OBSCURO*.

Genesis of curves by SHADOWS. See the article *CURVE*.

SHAFT of a column, in building, is the body thereof between the base and capital: so called from its straightness. See the article *COLUMN*.

The term shaft is also used for the spire of a church-steeple, and for the tunnel of a chimney. See the articles *SPIRE* and *CHIMNEY*.

SHAFT, in mining, is the pit or hollow entrance into the mine. See *MINE*.

SHAFTSBURY, a borough of Dorsetshire, twenty-five miles north-east of Dorchester; from whence the noble family of Cooper took the title of earl.

It sends two members to parliament.

SHAG, or **SHAGG**, in ornithology, a species of pelican, brown underneath, with twelve feathers in the tail; being very like the cormorant in shape, but of a different colour: it is about the size of a well fed duck, and is known among authors by the names *corvus aquaticus minor*, and *graculus palmipes*.

SHAGREEN, or **CHAGREEN**, in commerce, a kind of grained-leather, prepared, as is supposed, of the skin of a species of *squalus*, or hound-fish, called the shagreen, or shagrain; and much used in covering cases, books, &c.

It is imported from Constantinople, Tauris, Tripoli, Algiers, and from some parts of Poland, where it is prepared in the following manner: the skin being stretched out is first covered over with mustard-feed, which is bruised upon it: and being thus exposed to the weather for some days, it is then tanned.

The best is of a brownish colour, as the white sort is the worst: it is extremely hard; yet, when steeped in water, it becomes soft and pliable; and being fashioned into case-covers, it readily takes any colour, as red, green, yellow, black, according to the fancy of the workman.

Each shagreen skin pays, on importation, a duty of $4\frac{78\frac{1}{4}}{100}$ d. and draws back,

on exportation, $4\frac{51\frac{1}{4}}{100}$ d.

SHAKLES, in a ship, are the rings with which the ports are shut fast, by lashing the port-bar to them. There are also

shakles put upon bilbow-bolts, for confining the men who have deserved corporal punishment.

SHALLOP, or **SHALLOOP**, a particular sort of ship. See the article *SHIP*.

SHAMADE, or **CHAMADE**. See the article *CHAMADE*.

SHAMBLES, among mimers, a sort of niches, or landing places, left at such distances in the adits of mines, that the shovel-men may conveniently throw up the ore from shamble to shamble, till it comes to the top of the mine. See the articles *DIGGING*, *MINE*, &c.

SHAMMY, or **CHAMOIS-LEATHER**, a kind of leather, dressed either in oil or tanned; and much esteemed for its softness, pliancy, and being capable of bearing soap without hurt.

The true shammy is prepared of the skin of the chamois-goat. See the article *CHAMOIS*.

In France, &c. some wear the skin crude without any preparation; it is also used for the purifying mercury, which is done by passing it through the pores of this skin, which are very close. See the article *MERCURY*.

The true chamois leather is counterfeited with common goat, kid, and even sheep-skin; the practice of which makes a particular profession, called by the French *chamoisure*. The last is the least esteemed, yet so popular, and such vast quantities prepared, especially about Orleans, Marseilles, and Tholouse, that it may not be amiss to give the method of preparation.

The manner of chamoising, or of preparing sheep, goat, or kid-skins in oil, in imitation of chamois.

The skins being washed, drained, and smeared over with quick-lime, on the fleshy side, are folded in two, lengthwise, the wool outwards, and laid on heaps, and so left to ferment eight days; or if they had been left to dry after fleaving, for fifteen days.

Then they are washed out, drained, and half-dried, laid on a wooden leg or horse, the wool stripped off with a round staff for the purpose, and laid in a weak pit, the lime whereof had been used before, and had lost the greatest part of its force.

After twenty-four hours they are taken out, and left to drain twenty-four more; then put in another strong pit. This done, they are taken out, drained, and put in again by turns; which begins to

dispose them to take oil : and this practice they continue for six weeks in summer, or three months in winter ; at the end whereof they are washed out, laid on the wooden leg, and the surface of the skin on the wool side peeled off, to render them the softer ; then, made into parcels, steeped a night in the river ; in winter, more ; stretched six or seven over one another, on the wooden leg ; and the knife passed strongly on the flesh side, to take off any thing superfluous, and render the skin smooth.

Then they are stretched as before, in the river, and the same operation repeated on the wool-side ; then thrown into a tub of water with bran in it, which is brewed among the skins till the greatest part stick to them ; and then separated into distinct tubs, till they swell and rise of themselves above the water.

By this means, the remains of the lime are cleared out : they are then wrung out, hung up to dry on ropes, and sent to the mill, with the quantity of oil necessary to scour them : the best oil is that of stock-fish.

Here they are first thrown in bundles into the river for twelve hours, then laid in the mill trough, and filled without oil till they be well softened ; then oiled with the hand, one by one, and thus formed into parcels of four skins each, which are milled and dried on cords a second time, then a third ; then oiled again and dried.

This process is repeated as often as necessity requires : when done, if there be any moisture remaining, they are dried in a stove, and made up into parcels wrapped up in wool ; after some time they are opened to the air, but wrapped up again as before, till such time as the oil seems to have lost all its force, which it ordinarily does in twenty-four hours.

The skins are then returned from the mill to the chamoiser to be secured ; which is done by putting them into a lixivium of wood-ashes, working and beating them in it with poles, and leaving them to steep till the lye have had its effect ; then wrung out, steeped in another lixivium, wrung again, and this repeated till all the grease and oil be purged out. They are then half dried, and passed over a sharp-edged iron instrument, placed perpendicular in a block, which opens, softens, and makes them gentle : lastly, they are thoroughly dried, and passed over the same instrument again, which

finishes the preparation, and leaves them in form of shammy.

Kid and goat-skins are chamoised in the same manner as those of sheep, excepting that the hair is taken off without the use of any lime ; and that when brought from the mill they undergo a particular preparation called ramalling, the most delicate and difficult of all the others.

It consists in this, that as soon as brought from the mill they are steeped in a fit lixivium ; taken out, stretched on a round wooden leg, and the hair scraped off with the knife ; this makes them smooth, and in working cast a fine nap. The difficulty is in scraping them evenly.

SHANK, in the manege, that part of a horse's fore-leg which lies between the knee and the fetlock.

SHANK-PAINTER, in a ship, a short chain fastened under the fore-shrouds, by a bolt, to the ship's side ; having at the other end a rope spliced to the chain, on which the after-part of the anchor rests when it lies by the ship's side.

SHANKER, or **CHANCER**, in medicine, a malignant ulcer, usually occasioned by some venereal disorder. See the articles **GONORRHOEA** and **POX**.

Shankers are generally situated on those parts which have a fine and tender covering, as the inward duplicature of the prepuce in men, the inside of the pudenda in women, the nipples of nurses, and the lips and tongue of prostitutes ; in very bad cases they will appear on the dorsum penis, as well as on the pubes and inside of the thighs.

In the cure of a recent shanker, Astruc first orders bleeding, to abate the inflammation, then fomentations to resolve the induration ; not omitting mercurials in the mean time, but so as to avoid a salivation. After which he advises the use of sudorific decoctions of china, sarsaparilla, guaiacum, and iassafras boiled with antimony. In slight shankers, he recommends an ointment made of lapis calaminaris, half an ounce ; of sulphur and quicksilver, each one dram ; which are to be mixed with a sufficient quantity of turpentine to make an ointment. Cockburn says, any shanker may be cured with an ointment of quicksilver and turpentine, without farther trouble ; and Heister approves of the same method, Turner says, he always found smocking the parts with cinnabar successful in shancrous ulcerations on the glans and

prepuce of men, as well as the labia and sinus pudoris of women. His method was, to throw a dram of cinnabar on a hot iron, letting a fume ascend through a funnel, or a seat perforated like a closet-stool all round the diseased parts. This was done every day, and sometimes twice a day, for a week; the iron being hot enough to raise a flame with smoke, but not so fiery hot as to make it instantly consume in flame alone.

SHANNON, the largest river in Ireland, which rising in the county of Lestrim, runs southwards, dividing the provinces of Leinster and Connaught; and then turning south-west, runs through the province of Munster; and passing by the city of Limeric, afterwards falls into the western or Atlantic ocean.

SHARE of a plough, that part which cuts the ground, the extremity forwards being covered with a sharp-pointed iron, called the point of the share; and the end of the wood behind, the tail of the share. See the article **PLOUGH**.

The length of the whole share, from point to tail, according to Tull, should be three feet nine inches: at the top of the iron it has an upright piece, called the fin; and near the iron, at the other end, there is an oblong squared hollow, called the socket; the use of which is to receive the bottom of the sheat. Near the tail there is a thin plate of iron, well rivetted to the wood; by means of this plate the tail of the share is held firmly to the hinder sheat of the plough by a small iron pin, with a screw at the end, and a nut screwed on it, on the inner or right side of the sheat.

The point of the share is that part in which it does not run up into the fin: this point is generally made of three inches and a half in length, and should be flat underneath and round at top, and the lower part of it must be of hard steel. The edge of the fin should also be well steeled, and should make an acute angle with the share.

The socket is a sort of mortise; it should be a foot long, and about two inches deep: the fore end of it must not be perpendicular, but oblique, conformable to the end of the sheat which enters into it. The upper edge of the fore part must be always made to bear against the sheat; but if this end of the socket should not be quite so oblique as the sheat, it may be helped by paring off a small part of the wood at the point,

SHARK, in ichthyology, the english name of two species of *Squalus*, distinguished by their different colours, blue and white. See the article **SQUALUS**.

The blue shark, with a triangular fossa on the back, and no foramina at the eyes, is a most terrible fish of prey, growing to six, seven, or eight feet in length, and considerably thick in proportion: the mouth is large, and furnished with large broad teeth, some of them ferrated at the edges.

The white shark is flat-backed, and has more numerous teeth than the preceding species, being the largest of the whole genus of *Squali*; and weighing, when full grown, not less than a thousand pounds: it is called by authors *lamia*, and *carcharius*.

There is also another species called the *zygæna*, or hammer-headed shark. See the article **ZYGÆNA**.

SHARP, in music, a kind of artificial note; for the character and use of which see the articles **CHARACTER**, **FLAT**, **SCALE**, &c.

SHARP, in the sea-language, signifies hale taut, or tight.

SHARPING CORN, a customary gift of corn, said to be half a bushel, for plough-land, which the farmers pay some parts of England to their landlords every Christmas, for sharpening the plough-irons, harrow-tines, &c.

SHARPLING, one of the many names for the *gasterosteus*. See the article **GASTEROSTEUS**.

SHASTER, or **SHASTRAM**, a sacred book containing the religion of the Banians: it consists of three tracts; the first of which contains their moral law; the second, the ceremonial; and the third delivers the peculiar observances for each tribe of Indians.

SHAW, in our old writers, signifies a grove of trees.

SHEADING, a term used in the Isle of Man for a riding, tything, or division of that isle; the whole being divided into six of these sheadings; in each of which there is a coroner or constable, who is appointed by the delivery of a rod at the tinewald-court, or annual convention.

SHEARING, or **SHEERING**. See the article **SHEERING**.

SHEAT of a plough, a part passing through the beam, and fattened to the share. See the articles **PLOUGH** and **SHARE**.

SHEATHING, in the sea-language, the casing that part of a ship, which is

be under water, with fir-board of an inch thick; first laying hair and tar, mixed together, under the boards, and then nailing them on, in order to prevent worms from eating the ship's bottom.

SHEATS, in a ship, are ropes bent to the clews of the sails; serving, in the lower sails, to haul aft the clews of the sail; but, in top-sails, they serve to haul home the clew of the sail close to the yard-arm.

SHEEP, *ovis*, in zoology, a well known genus of quadrupeds, the horns of which are hollow, bent backward, twisted, and rugose: the fore-teeth are eight, and the hinder ones are narrower than the others: there are no canine, or dog-teeth.

Authors mention several species of sheep.

1. The common kind, with compressed and lunated horns; a very valuable, and not uncomely creature, covered with a thick and deep wool, curled and twisted.

2. The cretic sheep, with erect and spiral horns, and about the size of the common kind, which it greatly resembles in form.

3. The angola-sheep, with pendulous ears, a lax dewlap, and with the back of the head prominent: this species differs greatly from the common kind.

As to the choice of sheep to breed, the ram should be young, and his skin of the same colour with his wool, for the lambs will be of the same colour with his skin. He should have a large long body, a broad forehead, round, and well rising, large eyes, and strait and short nostrils. The polled sheep, that is those which have no horns, are found to be the best breeders. The ewe should have a broad back, a large bending neck, small, but short, clean and nimble legs, and a thick deep wool covering her all over. To know whether they be found or not, the farmer should examine the wool; that none of it be wanting, and see that the gums be red, the teeth white and even, the brisket-skin red, the wool firm, the breath sweet, and the feet not hot. Two years old is the best time for beginning to breed, and their first lambs should not be kept too long, to weaken them by suckling, but be sold as soon as conveniently may be. They will breed advantageously, till they are seven years old.

The farmers have a method of knowing the age of a sheep, as that of a horse is known by the mouth. When a sheep is one shear, as they express it, it has two

broad teeth before; when it is two shears it will have four; when three, six; and when four, eight: after this their mouths begin to break. The difference of land makes a very great difference in the sheep. The fat pastures breed strait, tall sheep, and the barren hills and downs breed square short ones; woods and mountains breed tall and slender sheep; but the best of all are those bred upon new-plowed land, and dry grounds. On the contrary, all wet and moist lands are bad for sheep, especially such as are subject to be overflowed, and to have sand and dirt left on them. The salt marshes are, however, an exception to this general rule, for their saltness makes amends for their moisture; any thing of salt, by reason of its drying quality, being of great advantage to sheep.

Sheep's dung is one of the best manures we know, succeeding better on cold lands than any other dung whatever; but as it is not so easily collected as the dung of large animals, it is commonly conveyed to the land, it is intended for, by folding the sheep upon it. See the articles **DUNG** and **FOLDING**.

Sheep-stealing, or killing them, in order to obtain their fat, &c. is felony without benefit of clergy.

SHEERING, or **SHEARING**, in the woollen manufacture, is the cutting off, with large sheers, the too long nap, in order to make the cloth more smooth and even. See the article **CLOTH**.

SHEERING, in the sea-language; when a ship is not steered steadily, they say she sheers, or goes sheering; or, when at anchor, she goes in and out, by means of the current of the tide, they also say she sheers.

SHEERS, in a ship, are two masts set across at the upper end of each other; a contrivance generally used for setting or taking out the masts of a ship, where there is no hulk to do that office.

SHEEVES, or **SHIVERS**. See **SHIVERS**.

SHEFFIELD, a market town of Yorkshire, 38 miles south-west of York.

SHEFFORD, a market-town of Bedfordshire, seven miles south of Bedford.

SHEFFNEL, a market-town of Shropshire, fourteen miles east of Shrewsbury.

SHEIK, an officer in the mosques of Egypt, whose business is the same with that of the imams of Constantinople. See **IMAM**.

SHEIK-BELLET, in the turkish affairs, a magistrate, answering to the mayor of a city with us.

SHELLS

Order 1. Univalves



The Cochlea with a Semicircular Mouth

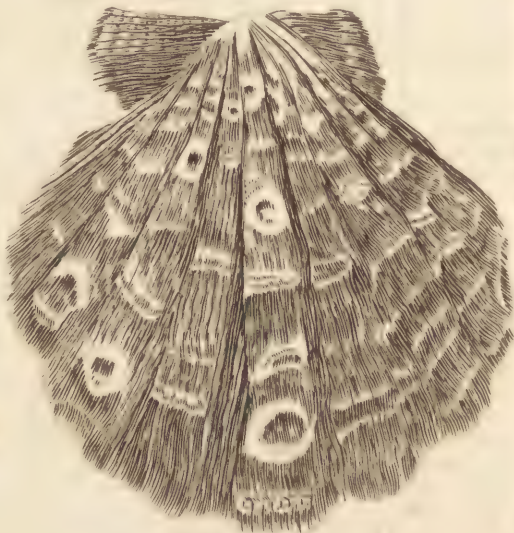


The Paper-Nautilus

Order 2. Bivalves

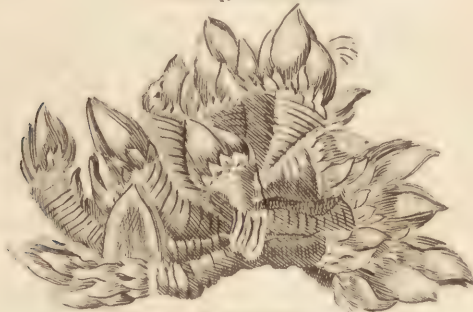


The Carolina-Muscle



The Coral-Scallop

Order 3. Multivalves



The Bluish-Polliceps

second, all those shells composed of two parts, or valves, under the name of bivalves; and the third, all shells composed of several parts, or valves, under the name of multivalves. See BIVALVES, MULTIVALES, and UNIVALVE.

This method takes in all the shells hitherto known; the land, as well as the sea-shells, being all comprehended under one or other of the foregoing divisions; indeed, all the recent land-shells are univalves; but the fossil-shells belong to all the three series. See plate CCXLVI. *Fossil-SHELLS*, those found buried at great depths in earth, and often immersed in the hardest stones. These fossil-shells, as well as those found lying on the sea-shore, make an excellent manure, especially for cold clayey lands; upon which it does not produce nearly so great an effect for the two first years, as it does in the succeeding ones; the reason of which is, that it is not then sufficiently mixed, but in succeeding time it breaks itself into a number of very small particles, and these all become intimately blended with the molecules of earth, and produce their effect more properly.

Polishing of SHELLS. See POLISHING.

SHELTIE, a small but strong kind of horse, so called from Shetland, or Zetland, where they are produced.

SHEPPEY, an island at the mouth of the river Medway, making part of the county of Kent.

SHEPTON MALLET, a market-town, fifteen miles south-west of Bath.

SHERARDIA, in botany, a genus of plants, belonging to the tetrandria-monogynia class: its flower is monopetalous and tubular, divided into four segments at the limb; and its fruit is an oblong body, separable longitudinally into two oblong seeds, convex on one side, and plane on the other, and with three points at their summit.

SHERBORN, a market-town, 12 miles south-west of York.

SHERBRO, a fort at the mouth of the river Sherbro, in Guinea, formerly in the possession of the English.

SHERENESS, a fort on the north-west part of the isle of Sheppey, situated at the mouth of the river Medway, to defend its entrance.

SHERIFF, an officer in each county of England, nominated by the king, invested with a judicial and ministerial power, and who takes place of every

nobleman in the county, during the time of his office. His judicial authority consists in hearing and determining causes in his county-court, and in keeping the peace of the county; he being by the common law the principal conservator of the peace there; for which reason he is to assist the justices, and raise the posse comitatus when occasion requires; and such persons, as on a hue and cry he shall apprehend upon suspicion of felony, he is to commit to prison; he may also imprison any one who breaks the peace in his presence. The ministerial office of the sheriff consists in proclaiming statutes, and making returns of writs for electing knights of the shire, &c. He collects the king's rents, seizes the profits of lands forfeited, and the goods of felons, levies the king's debts, fines, amercements, &c. and is accountable to the king for the profits of the county, on which account the sum of 4000 l. is set apart annually allowed to the sheriffs of the several counties of England, to help them to pass their accounts; and to defray their expences at the assizes, &c. where no sheriff is obliged to keep a table for the entertainment of any persons but those of his own retinue; neither is he to have above forty servants in livery, or less than twenty attending him. It is also his office to execute the writs and processes out of the king's court; and no process is to be served but by the sheriff. He returns juries for trials, as well in civil as in criminal cases, except where there is cause of challenge against him, in which case they are to be returned by the coroner. And, lastly, the sheriff is to see that criminals are executed, and the order of law observed in putting them to death. A sheriff has usually under him an under-sheriff, bailiffs, and a gaoler, for all of whom he is answerable. An under-sheriff ought always to have his deputy in the courts of justice, in order to receive their commands, and give an account of business, &c. All returns made by the under-sheriff are in the name of the high-sheriff; for every default in the execution of his office, either by fraud or neglect, the high-sheriff is amerceable in the exchequer. On the death of any sheriff, the under-sheriff shall officiate in his name, till another is appointed, and also to be answerable, &c.

In London, the lord mayor and citizens elect their sheriffs; and by a by-law of the

the city, if any person refuse to take upon him the office, he is to pay 420*l.* fine, unless he makes oath that he is not worth 10,000 *l.*

SHEW-BREAD, among the Hebrews, the name given to those loaves of bread which the priests placed every sabbath-day upon the golden table in the sanctuary. The shew-bread consisted of twelve loaves, according to the number of the tribes; these were served up hot on the sabbath-day, and at the same time the stale ones which had been exposed all the week were taken away. It was not lawful for any one to eat of those loaves but the priests only: this offering was accompanied with salt and frankincense, which was burnt upon the table at the time they set on fresh loaves.

SHIELD, an antient weapon of defence, in the form of a light buckler, borne on the arm, to turn off lances, darts, &c.

SHIELD, in heraldry, the escutcheon or field on which the bearings of coats of arms are placed. See **ESCUTCHEON**.

SHILLING, an english silver coin. See the article **COIN**.

It is observed that there were no shillings or twelve-penny pieces in England till the year 1504. when they were first coined by Henry VIII.

SHINGLES, in building, small pieces of wood, or quartered oaken boards, sawn to a certain scantling, or, as is more usual, cleft to about an inch thick at one end, and made like wedges, four or five inches broad, and eight or nine inches long.

Shingles are also used instead of tiles or slates, especially for churches and steeples: however this covering is dear; yet where tiles are very scarce, and a light covering is required, it is preferable to thatch; and where they are made of good oak, cleft, and not sawed, and well seasoned in water and the sun, they make a sure, light, and durable covering.

The building is first to be covered all over with boards, and the shingles nailed upon them.

SHINGLES, in medicine, a kind of herpes. See the article **HERPES**.

SHIP, *navis*, a general name for all large vessels with sails, fit for navigation on the sea; except galleys, which go with oars and smack-tails. See **NAVIGATION**, **NAVAL AFFAIRS**, and **NAVY**.

A ship is undoubtedly the noblest machine that ever was invented; and consists of so many parts, that it would require a whole volume to describe it mi-

nutely. However, we shall endeavour to satisfy the reader the more fully on this head, as it is an article of the utmost importance, of which no gentleman should be ignorant: and first to give an idea of the several parts and members of a ship, both external and internal, with their respective names in the sea-language, in plate CCXLVII. is represented a ship of war of the first rate, with rigging, &c. at anchor; where A is the car-head; B, the fore-chains; C, the main-chains; D, the mizzen-chains; E, the entring-port; F, the hawse-holes; G, the poop-lanterns; H, the chels-tree; I, the head; K, the stern.

L, the bowsprit; 1, 2, yard and sail; 3, gammoning; 4, horse; 5, bob stay; 6, sprit-sail sheets; 7, pendants; 8, braces and pendants; 9, halliards; 10, 11, 12, clew-lines; 13, sprit-sail horses; 14, bunt-lines; 15, standing lifts; 16, sprit-sail top; 17, flying jib-boom; 18, flying jib-stay and sail; 19, halliards; 20, horses.

M, the sprit-sail top-mast; 21, shrouds; 22, 23, yard and sail; 24, sheet; 25, lifts; 26, braces and pendants; 27, 28, jack-staff; 29, truck; 30, jack flag; N, the fore mast; 31, runner and tackle; 32, 33, shrouds; 34, laniards; 35, top and laniard; 36, preventer-stay and laniard; 37, woodling the mast; 38, yard and sail; 39, horses; 40, top; 41, cross-foot; 42, jeers; 43, yard-tackles; 44, lifts; 45, braces and pendants; 46, sheets; 47, fore-tacks; 48, bow-ropes and bridles; 49, fore bunt-lines; 50, fore leech-lines; 51, fore top-ropes; 52, puttock-shrouds.

O, the fore-top-mast; 53, 54, shrouds and laniards; 55, yard and sail; 56, top and sail; 57, runner; 58, back-stay; 59, halliards; 60, lifts; 61, braces and pendants; 62, horses; 63, clew-lines; 64, bow-lines and bridles; 65, reet-tackles; 66, sheets; 67, bunt-lines; 68, cross-trees; 69, cap.

P, the fore-top gallant-mast; 70, 71, shrouds and laniards; 72, yard and sail; 73, back-stays; 74, stay; 75, lifts; 76, clew-lines; 77, braces and pendants; 78, bow-lines and bridles; 79, flag-mast; 80, truck; 81, flag-staff-stay; 82, flag of lord high-admiral.

Q, the main-mast; 83, 84, shrouds; 85, laniards; 86, runner and tackle; 87, pendant of the gornet; 88, guy; ditto. 89, sail of ditto. 90, stay; 91, preventer-stay; 92, stay-tackles;

er within

the grat-
bre-mast;
lfray; 21,
the gang-
; 23, the

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27, the
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and fur-
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; 76,
matts,
&c.

wooding the mast; 94, jeers; 95, yard-tackles; 96, lifts; 97, braces and pendants; 98, horses; 99, sheets; 100, tacks; 101, bow-lines and bridles; 102, crow-foot; 103, top-rope; 104, top; 105, bunt-lines; 106, leech-lines; 107, yard and sail.

R, the main-top-mast; 108, 109, shrouds and laniards; 110, yard and sail; 111, puttock-shrouds; 112, back-stays; 113, stay; 114, stay-sail and stay and halliards; 115, runnets; 116, halliards; 117, lifts; 118, clew-lines; 119, braces and pendants; 120, horses; 121, sheets; 122, bow-lines and bridles; 123, bunt-lines; 124, reef-tackles; 125, cross-trees; 126, cap.

S, the main-top gallant-mast; 127, 128, shrouds and laniards; 129, yard and sail; 130, back-stays; 131, stay; 132, stay-sail and halliards; 133, lifts; 134, braces and pendants; 135, bow-lines and bridles; 136, clew-lines; 137, flag-staff; 138, truck; 139, flag-staff-stay; 140, flag-standard.

T, the mizzen-mast; 141, 142, shrouds and laniards; 143, pendants and burtons; 144, yard and sail; 145, crow-foot; 146, sheet; 147, pendant-lines; 148, peck-brails; 149, stay-sail; 150, stay; 151, derrick and spann; 152, top; 153, cross jack-yard; 154, cross jack-lifts; 155, cross jack-braces; 156, cross jack-slings.

V, the mizzen-top-mast; 157, 158, shrouds and laniards; 159, yard and sail; 160, back-stays; 161, stay; 162, halliards; 163, lifts; 164, braces and pendants; 165, bow-lines and bridles; 166, sheets; 167, clew-lines; 168, stay-sail; 169, cross-trees; 170, cap; 171, flag-staff; 172, flag-staff-stay; 173, truck; 174, flag-union; 175, ensign-staff; 176, truck; 177, ensign; 178, poop-ladder; 179, bower-cable.

Thus we have pointed out the external parts, masts, rigging, &c. an account of all which may be seen under their respective articles MAST, HULL, ROPE, RUDDER, &c.

In plate CCXLVIII. is represented the section of a first rate ship of war, shewing the inside thereof: where A is the head; containing, 1, the stem; 2, the knee of the head, or cut-water; 3, the lower and upper cheek; 4, the tail-board; 5, the figure; 6, the gratings; 7, the brackets; 8, the false stem; 9, the breast-hooks; 10, the hause-hole; 11, the bulk-head, forward; 12, the cat-head; 13, the cat-hook; 14, ne-

cessary seats; 15, the manger within board; 16, the bow-sprit.

B, upon the fore-castle; 17, the gratings; 18, the partners of the fore-mast; 19, the gun-wale; 20, the belfry; 21, the funnel for the smock; 22, the gangway going off the fore-castle; 23, the fore-castle guns.

C, in the fore-castle; 24, the door of the bulk-head, forward; 25, the officers cabbins; 26, the stair-case; 27, the fore-top-sail-sheet bits; 28, the beams; 29, the car-lines.

D, the middle-gun-deck forward; 30, the fore-jeer bits; 31, the oven and furnace of copper; 32, the captain's cook-room; 33, the ladder, or way up into the fore-castle.

E, the lower-gun-deck forward; 34, the knees fore and aft; 35, the spirkerings, or the first streak next to each deck; the next under the beams being called clamps; 36, the beams of the middle gun deck, fore and aft; 37, the car-lines of the middle gun-deck, fore and aft; 38, the fore-bits; 39, the after or main-bus; 40, the hatchway to the gunner's and boatswain's store-rooms; 41, the jeer capston.

F, the orlop; 42, 43, 44, the gunner's boatswain's, and carpenter's store-rooms; 45, the beams of the lower gun-deck; 46, 47, the pillars and the riders, fore and aft; 48, the bulk-head of the store-rooms.

G, the hold; 49, 50, 51, the foot-hook-rider, the floor-rider, and the standirt, fore and aft; 52, the pillars; 53, the step of the fore-mast; 54, the keelson, or false keel, and dead rising; 55, the dead wood.

H, a-midships in the hold; 56, the floor-timbers; 57, the keel; 58, the well; 59, the chain-pump; 60, the step of the main-mast; 61, 62, beams and car-lines of the orlop, fore and aft.

I, the orlop a-midships; 63, the cable-tire; 64, the main hatchway.

K, the lower gun-deck a-midships; 65, the ladder leading up to the middle gun-deck; 66, the lower tire or ports.

L, the middle gun-deck a-midships; 67, the middle tire-ports; 68, the entring-port; 69, the main jeer-bits; 70, twisted pillars or flantions; 71, the capston; 72, the gratings; 73, the ladder leading to the upper deck.

M, the upper gun-deck a-midships; 74, the main-top-sail-sheet bits; 75, the upper partners of the main-mast; 76, the gallows on which spare top masts,

&c.

&c. are laid ; 77, the fore sheet-blocks ; 78, the rennets ; 79, the gun-wale ; 80, the upper gratings ; 81, the drift-brackets ; 82, the piss-dale ; 83, the capstion-pall.

N, abaft the main-mast ; 84, the gangway off the quarter-deck ; 85, the bulk-head of the coach ; 86, the stair-case down to the middle gun-deck ; 87, the beams of the upper deck ; 88, the gratings about the main-mast ; 89, the coach, or council-chamber ; 90, the stair-case up to the quarter-deck.

O, the quarter-deck ; 91, the beams ; 92, the car-lines ; 93, the partners of the mizzen mast ; 94, the gangway up to the poop ; 95, the bulk-head of the cuddy. P, the poop ; 96, the trumpeter's cabin ; 97, the tafferel.

Q, the captain-lieutenant's cabin.

R, the cuddy, usually divided for the master and secretary's officers.

S, the state-room, out of which is made the bed-chamber, and other conveniencies for the commander in chief ; 98, the entrance into the gallery ; 99, the bulk-head of the great cabin ; 100, the stern-lights and after-galleries.

T, the ward-room, allotted for the lieutenants and land-officers ; 101, the lower gallery ; 102, the steerage and bulk-head of the ward-room ; 103, the whipstaff, commanding the tillar ; 104, the after-stair-case down to the lower gun-deck.

V, several officers cabbins abaft the main-mast, where the soldiers generally keep guard.

W, the gun-room ; 105, the tillar commanding the rudder ; 106, the rudder ; 107, the stern-post ; 108, the tillar-transom ; 109, the several transoms, viz.

1, 2, 3, 4, 5 ; 110, the gun-room-ports, or stern-chase ; 111, the bread-room-scuttle, out of the gun-room ; 112, the main-capstion ; 113, the pall of the capstion ; 114, the partner ; 115, the bulk-head of the bread-room.

X, the bread-room ; Y, the steward's room, where all provisions are weighed and served out ; Z, the cock-pit, where are subdivisions for the purser, the surgeon, and his mates.

AA, the platform, or orlop, where provision is made for the wounded in time of service ; 116, the hold abaft the main-mast ; 117, the step of the mizen-mast ; 118, the keelson, or false keel ; 119, the dead-wood, or rising.

Different kinds of SHIPS. All ships at first

were of the same form, whatever uses they were designed for ; but the various ends of navigation, some of which were better answered by one form, some by another, soon gave occasion to build and fit out ships, not only different in bigness, but also in their construction and rigging ; and as trade gave occasion to the fitting out large fleets of different kinds of merchant-ships ; so ships of war became necessary to preserve them to their just proprietors. These last, or ships of war, have three masts and a bowsprit, and are sailed with square sails ; the other parts being as described above, and represented in plate CCXLVII.

But besides these, there are other forms : as, 1. The bilander, (plate CCXLVIII. fig. 2.) which has rigging and sails, not unlike a hoy only broader and flatter ; bilanders are seldom above twenty-four tons, and can lie nearer the wind than a vessel with cross-sails can do. 2. Bomb-vessels (*ibid.* fig. 3.) have sometimes three masts, and square sails, as represented ; but they are also frequently ketch-fashion, with one mast and a mizen. 3. Brigantines (*ibid.* fig. 4.) are now disused, but had two masts, and square sails. 4. Hagboats (*ibid.* fig. 5.) are masted and sailed ship-fashion, but are built in the form of the dutch fly-boats. 5. Hoys (*ib.* fig. 6.) are fitted with one mast and a sprit-sail ; whose yards stand fore and aft like a mizen, so that it can lie near the wind. 6. Hulks (*ib.* fig. 7.) are generally old ships cut down to the gun-deck, and fitted with a large wheel, for men to go in when careening ; it has also several capstons fixed on its deck, for setting ship's masts. 7. Ketches (*ibid.* fig. 8.) are fitted with two masts, and their main-sail and top-sail stand square, as those of ships do ; but their fore-sail and jibbs, as those of hoys do. 8. Lighters (*ib.* fig. 9.) are vessels made use of for laying down or shifting the moorings, for bringing ashore or carrying on board ships cables, anchors, &c. 9. Pinks (*ibid.* fig. 10.) sail with three masts, ship-fashion, but are round sterned, with a small projection above the rudder. 10. Punts (*ib.* fig. 11.) are built square, and used about the docks for fetching clay, and other services as the master ship-wright wants them for. 11. Shallop (*ib.* fig. 12.) is a small light vessel, with only a small main and fore-mast, and lugg-sails, to haul up and let down on occasion. 12. Sloops (*ibid.* fig. 13.) have only one mast, with shoulder of mutton, square, lugg, and smack

Fig. 2. Bilander.



Fig. 3. Bomb-Vessel.



Fig. 4. Brigant.



Fig. 10. Pink.

Fig. 9. Lighter.

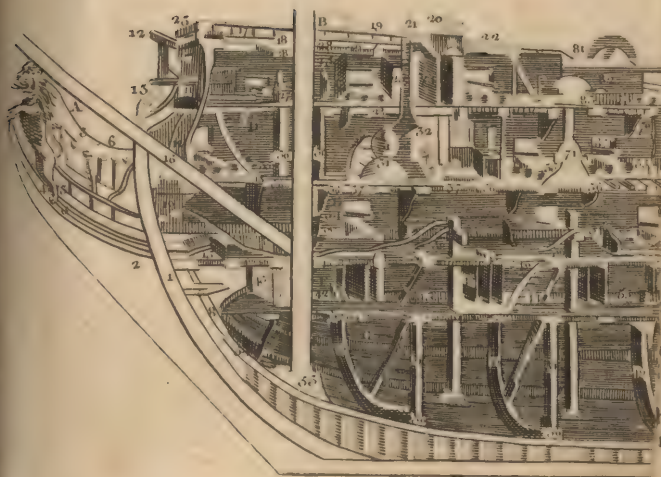


Fig. 11. Punc.



Fig. 1. The Section of a First Rate Ship.

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smack sails. 13. Smacks (*ibid.* fig. 14.) are transporting vessels, with one mast, and an half spit-sail. 14. Yachts (*ibid.* fig. 15.) have only one mast, with an half spit or smack-sail, and sometimes ketch-fashion. See the articles BILANDER, BOMB-KETCH, BRIGANTINE, &c.

Construction of SHIPS. Naval architecture may be divided into three principal parts :

1. To give the ship such a figure and proportion, as may suit the service she is designed for. 2. To find the true form of all the pieces of timber that shall be necessary to compose such a solid. 3. To make proper accommodations for guns, ammunition, provisions, and apartments for all the officers, and likewise room for the cargo.

As to the first part, the length of the keel, greatest breadth, depth in the hold, height between decks and in the wale, and sometimes the height and breadth of the wing-transom, in ships for the merchants service, are agreed on by contract ; and from these dimensions the builder forms a draught suitable to the trade the ship is designed for. The first thing that is generally done, is to lay down the keel, the stem, and stern post upon the sheer-plane, or plane supposed to pass through the middle line of the keel, stem, and stern-post, cutting the ship in two halves lengthwise. They next determine the proper station of the mid ship-timber, where a perpendicular is erected ; and is generally about two thirds of the keel before the stern-post ; on this line the given depth of the hold is set off, from the upper side of the keel ; to obtain which point, the thickness of all the timber and plank must be added to the height agreed on. This being fixed, will enable us to determine the upper-height of the extreme or greatest breadth of the ship ; which, sometimes, is that very point ; and from the same place the lower height of the breadth must be determined. The two main heights of the breadth-lines, which nearly unite abaft and afore, are next determined. The height of the breadth-line of the top-timber is next formed ; being limited in the midship by contract, but afore and aft only by the judgment and fancy of the artist. If a square stern is designed, the breadth at the wing-transom is limited, being generally about two thirds of the greatest breadth. The artist next fixes the breadth of the top-timber, and then describes the two half-breadth lines. After these are formed,

the places where the several timbers are fixed : and for forming the midship-frame, radii are assumed at pleasure, till the sweeps are made to please the fancy and judgment of the artist. When this midship-frame is formed, a pattern or mould is made to fit exactly to the curve, and the dead-rising or water-line ; and by this and a hollow mould, all the timbers are formed, as far as the rising-line, which is parallel to the lower height of the breadth-line.

We come next to consider the upper-works, or all that is above water, called the dead-work ; and here the ship must be narrower, by which means she will strain less by working the guns, and the main-sail will be easier trimmed, as the shrouds spread less than they would otherwise do. But though these advantages are gained by narrowing a ship above water, yet great care must be taken not to narrow her too much, lest there should not be sufficient room upon the upper deck for the guns to recoil. The security of the masts should likewise be considered, which require sufficient breadth to spread the shrouds : though this may be assisted by enlarging the breadth of the channels.

Principal qualities belonging to SHIPS. A ship of war should carry her lower tire of guns four or five feet above water ; a ship for the merchants service should stow the cargo well : and both of them should be made to go well, carry a good sail, steer well, and lie-to easily in the sea. 1. To make a ship carry a good sail, Mr. Du Hamel recommends a flat floor timber, and somewhat long, or the lower futtock pretty round ; also a straight upper futtock, and the top-timber to throw the breadth out aloft ; and at any rate, to carry her main-breadth as high as the lower-deck ; for if the rigging be well adapted to such a body, and the upper-works heightened as much as possible so as all to concur to lower the center of gravity, there will be no room to doubt of her carrying a good sail. 2. To make a ship steer well, and answer the least motion of the helm, the fashion-pieces should be well forn ed, the tuck carried pretty high, and the midship-frame carried pretty forward ; also there should be a considerable greater draught of water abaft than afore, a great rake forward, and none abaft, and a snug quarter-deck and fore-castle : all these will make a ship steer well. But to make her feel the least motion of her helm, it will be necessary to regard her masts ; for a

ship that goes well, will certainly steer well. 3. To make a ship carry her guns well out of the water, is effected by a long floor-timber, and not of great rising, a very full midship-frame, and low tuck, with light upper-works. 4. To make a ship go smoothly through the water, without pitching hard, her keel should be long, her floor long and not rising high afore or aft; the area or space contained in the fore-body should also be duly proportioned to that of the after body, according to the respective weights they are to carry. 5. To make a ship keep a good wind, she should have a good length by the keel, not too broad, but pretty deep in the hold; which will make her floor-timber short, and rising great. As such a ship will meet with great resistance in the water going over the broad side, and but little when going a-head, she will not fall much to the leeward. Now some ship-builders imagine, that it is impossible to make a ship carry her guns well, carry a good sail, and be a prime sailer at the same time, because it requires a very full bottom to gain the two first qualities, and a sharp bottomed ship best answers the latter: but when it is considered, that a full ship will carry a great deal more sail than a sharp one, a good artist may so form the body as to have all these three good qualities united, and likewise steer well: for which purpose, Mr. Du Hamel recommends somewhat more in length than has been commonly practised.

SHIPTON, a market-town, twenty-four miles south-east of Worcester.

SHIRE, in geography, signifies the same as county; being originally derived from the saxon *sciran*, to divide. See the articles **COUNTY**, **SHERIFF**, and **Lord LIEUTENANT**.

SHIVERS, or **SHEEVERS**, in the sea-language, names given to the little rollers or round wheels of pulleys. See the article **PULLEY**.

SHOAD, among miners, denotes a train of metalline stones, serving to direct them in the discovery of mines. See **MINE**.

SHOAL, in the sea-language, denotes a place where the water is shallow.

SHOAR, or **SHORE**. See **SHORE**.

SHOE, *calceus*, a covering for the foot, usually made of leather, by the company of cordwainers. See **CORDWAINERS**.

Horse SHOES. See the article **HORSE**.

SHOE for an anchor, in a ship, the place for the anchor to rest, and fitted to receive the stock, &c. so as to prevent the sheets,

tacks, and other running-rigging, from galling, or being entangled with the flooks.

SHOOTING. See the articles **GUNNERY** and **PROJECTILES**.

SHORE, or **SHOAR**, a place washed by the sea, or by some large river.

Count Marfigli divides the sea-shore into three portions; the first of which is that tract of land which the sea just reaches in storms and high tides, but which it never covers; the second part of the shore, is that which is covered in high tides and storms, but is dry at other times; and the third is the descent from this, which is always covered with water. See **SEA**. The first part is only a continuation of the continent, and suffers no alteration from the neighbourhood of the sea, except that it is rendered fit for the growth of some plants, and wholly unfit for that of others, by the saline steams and impregnations: and it is scarce to be conceived by any, but those who have observed it, how far on land the effects of the sea reach, so as to make the earth proper for plants, which will not grow without this influence; there being several plants frequently found on high hills, and dry places, at three, four, and more miles from the sea, which yet would not grow, unless in the neighbourhood of it, nor will ever be found elsewhere.

The second part or portion of the shore is much more affected by the sea than the former, being frequently washed and beaten by it. Its productions are rendered salt by the water, and it is covered with sand, or with the fragments of shells in form of sand, and in some places with a tartarous matter deposited from the water; the colour of this whole extent of ground is usually dusky and dull, especially where there are rocks and stones, and these covered with a slimy matter.

The third part of the shore is more affected by the sea than either of the others, and is covered with an uniform crust of the true nature of the bottom of the sea, except that plants and animals have their residence in it; and the decayed parts of these alter it a little.

SHOREHAM, a borough and port town of Suffex, twenty five miles east of Chichester.

It sends two members to parliament.

SHORT-SIGHTEDNESS, *myopia*, in medicine. See the article **MYOPIA**.

SHOT, a denomination given to all sorts of balls for fire arms; those for cannon being

being of iron, and those for guns, pistols, &c. of lead.

For the method of granulating shot for the use of fowlers, see GRANULATION.

Trundie-SHOT, an iron-shot, about seventeen inches long, and sharp-pointed at both ends, with a ball of lead fastened upon it, about a hand-breadth from each end.

SHOTTEN, or **Blood-SHOTTEN**. See the article **BLOOD**.

SHOVELER, in ornithology, a species of the anas, with the extremity of the beak broad and round, and its unguis bent. See the article **ANAS**.

SHOULDER-BONE, *humerus*, in anatomy. See the article **HUMERUS**.

SHOULDER BLADE, *scapula*. See the article **SCAPULA**.

SHOULDER-PITCHED, among farriers, is said of a horse whose shoulder is displaced, which may be remedied by swimming the horse a dozen times up and down in deep water.

SHOULDER-SPLAIT, is when a horse's shoulder is parted from the breast.

SHOULDERING PIECE, among builders, the same with a bracket. See the article **BRACKET**.

SHOWER, in meteorology, a cloud resolved into rain. See the article **RAIN**.

SHREW-MOUSE, or **Hardy-SHREW**, *forex*, or *mus araneus*, in zoology, a genus of quadrupeds, of the order of the glires; the upper fore-teeth of which are bifid, and the lower ones serrated: the upper canine-teeth are very small, and four in number.

The shrew-mouse is an extremely singular little animal, which greatly resembles the common mouse, but is somewhat smaller.

SHREWSBURY, the county-town of Shropshire, situated on the river Severn; west long. $2^{\circ} 46'$, north lat. $52^{\circ} 46'$.

It sends two members to parliament.

SHRIMP, in ichthyology, the english name of two different species of the squilla, *viz.* the common shrimp, and the smooth-nosed shrimp. See **SQUILLA**.

The common shrimp is the long-tailed squilla, with the snout serrated above and tridentated below; the body is oblong and rounded above the beak or snout; which distinguishes it from all the other species: it is long, of a lanceolated figure, sharp-pointed, and has eight denticulations above, and three below. The smooth-nosed shrimp, or long-tailed squilla, with a smooth snout, grows to the same size with the common shrimp; how-

ever the body is thick, and the snout is very short, without the spines or denticulations of the other.

SHRINE, in ecclesiastical history, a case or box, to hold the relics of some saint. See the articles **RELICS** and **SAINT**.

SHRITE, in ornithology, the same with the missel-bird. See **MISSSEL**.

SHROPSHIRE, a county of England, bounded by Cheshire on the north, by Staffordshire on the east, by Herefordshire on the south, and by Montgomeryshire on the west.

SHROUDS, or **SHROWDS**. See the article **SHROWDS**.

SHROVE-TUESDAY, is the Tuesday after quinquagesima Sunday, or the day immediately preceding the first of lent; being so called from the saxon word *shrive*, which signifies *to confess*, as having been employed by the people in time of popery, in confessing their sins, in order to receive the sacrament, and thereby qualify themselves for a more religious observation of lent. See the article **LENT**.

In process of time this custom was changed into that of mutual invitations, in order to take leave of flesh-meat and other dainties; and this made way for sports and other merriments which at present make up the whole business of the carnival, or season immediately preceding lent. See the article **CARNIVAL**.

SHROWDING of trees, the cutting or lopping off their top branches; which is practised only on trees not fit for timber, and designed to yield a present advantage, and serve for fuel.

Trees should be three or four years old before they are shrowded, which should be done in winter for the harder sorts of wood, and in spring for the softer kinds, taking care to cut the remaining stump aslope and smooth.

SHROWDS, or **SHROUDS**, in a ship, are the great ropes which come down both sides of the masts, and are fastened below to the chains on the ship's side, and aloft to the top of the mast; being parcelled and served, in order to prevent the mast's galling them. The top-mast-shrowds are fastened to the puttock-plates, by dead eyes and laniards, as the others are. See the article **SHIP**.

Some of the terms relating to the shrowds are: ease the shrowds; that is, slacken them: and, set up the shrowds; that is, set them stiffer.

SHRUB, *frutex*, among naturalists, de-

notes a dwarf-tree, or a woody plant less than a tree: such are holly, box, privet, &c.
SHUTTLE, in the manufactures, an instrument much used by weavers, in the middle of which is an eye, or cavity, wherein is inclosed the spool with the woof. See the article **WEAVING**.

SI, in music, a seventh note or sound, added by Le Maire to the six antient notes invented by Guido Arentine, *viz.* *ut, re, mi, fa, sol, la, si*. See the articles **GAMUT**, **SCALE**, and **SOLFAING**.

SIAM, the capital of a kingdom of the same name, in the farther peninsula of India: east long. 101° , north lat. 14° .

SIBA, a province of the bither India, situated between Tibet on the east, and Labor on the west.

SIBALDIA, in botany, a genus of the pentandria-pentagynia, clafs of plants, the flower of which consists of five oval petals; and its seeds, which are five in number, are contained in the bottom of the cup, which closes for that purpose.

SIBERIA, or **ASIATIC RUSSIA**, the most northern country of Asia, situated between 60° and 130° east longitude, and between 47° and 72° north latitude; being upwards of two thousand miles in length from east to west, and one thousand five hundred miles in breadth from north to south. We include the Calmuc Tartars within the limits of Siberia, as they acknowledge themselves subject to the empire of Russia.

SIBIT, a town of Arabia Foelix, situated in east long. 45° , north lat. 15° .

SIBTHORPIA, in botany, a genus of the didynamia-angiospermia clafs of plants, the calyx of which is a single leaved, turbinate, patent perianthium, cut into five, oval, permanent segments: the corolla consists of a single, patent, equal petal, of the length of the cup, and divided into five segments; the fruit is a compressed, orbiculated capsule, which is biventricose, bivalvar, and bilocular, with a transverse dissipation: the seeds are but few in number, convex on one side, and plain on the other.

SIBYLS, *sibylla*, in pagan antiquity, certain women said to have been endowed with a prophetic spirit, and to have delivered oracles, fore-showing the fates and revolutions of kingdoms, &c. The most eminent of the ten sibyls mentioned by antient writers, was she whom the Romans called the cumæan or erythræan sibyl, from her being born at Erythræ in Ionia, and removing from

thence to Cumæ in Italy, where she delivered all her oracles from a cave, dug out of the main rock, according to Virgil, *Æn.* III. 441, &c.

There is still preserved, in eight books of greek verses, a collection of verses, pretended to have been delivered by the sibyls; but the generality of critics look upon it as spurious: and it is the opinion of Prædeux, that the story of the three books of the sibyls, sold to Tarquin, was a state-trick or fetch of politics.

SICE-ACE, a game with dice and tables, whereat five may play; each having six men, and the last out losing.

At this game, they load one another with aces; sixes bear away; and doublets drinks, and throws again.

SICHEM, or **ZICHEM**, a town of Brabant, eighteen miles east of Mechlin.

SICILIAN, in music, a kind of air or dance, in triple time, and played slow, notwithstanding it is marked the same as a jig.

SICILY, the largest of all the italian islands, antiently called Trinacria, from its triangular figure: it is situated between 12° and 16° east longit. and between 37° and 39° north latitude: being about one hundred and seventy miles long, and one hundred broad.

It is separated from Calabria, in Italy, by the streights of Messina, which, in the narrowest part is not seven miles over.

SICKNESS, *Falling-SICKNESS*, *Green-SICKNESS*, &c. See the articles **DISEASE**, **EPILEPSY**, **CHLOROSIS**, &c.

SICUT ALIAS, in law, another writ issued out like the former, where the first was not executed.

SICYANIA, or **GOURD-WORM**, in natural history, a genus of the apteria order of insects, being of an oblong form, flat on the belly, and rounded on the back; the skin is soft; and the mouth large, horizontal, and emarginated, or dented in the middle. It grows to two thirds of an inch in length, though more usually it is not half that size; its breadth is nearly two thirds of its length. See the article **APTERIA**.

SICYOS, or **SICYOIDES**, in botany, a genus of the monœcia-syngenesia clafs of plants, the corolla of which is formed of a single campanulated petal, divided into five segments; and its fruit is a berry, containing only a single seed.

Dillenius calls this plant bryonoides.

SIDA, in botany, a genus of the monadelphia-polyandria clafs of plants, with a pentapetalous flower; the fruit is a roundish

roundish capsule, terminating in a point, and composed of several horns, which finally separating, tear the complex vessel to pieces; the seeds are roundish and pointed, the one side being convex, and the other of an angular figure.

This genus comprehends the malvinda and abutilon of authors. See the article ABUTILON.

SIDE, *latus*, the half of any thing, as an animal, a ship, &c. The sides of an animal are distinguished into the right and left side; but those of a ship, into the starboard and larboard side. See the articles STARBOARD, &c.

In geometry, the sides of a rectilinear figure are the lines which form its periphery. See FIGURE and PERIPHERY.

SIDE of a power, the same with its root. See the article ROOT.

SIDE-LAYS, among hunters, dogs that are let slip at a deer, as he passes.

SIDES-MEN, or **SYNOD'S MEN**, persons who, in large parishes, are appointed to assist the church-wardens, in their enquiry and presentments of such offenders to the ordinary, as are punishable in the spiritual court.

SIDEN, a port town of Arabia, situated on the eastern shore of the Red sea, in east long. $42^{\circ} 15'$, and north lat. $21^{\circ} 20'$.

SIDERATION, a term used for a sphacelus or mortification. See SPHACELUS. Some also use the term sideration for the blasting or blighting of trees. See the articles BLIGHT and TREE.

SIDERAL YEAR. See the article YEAR.

SIDERIA, in natural history, the name of a genus of crystals, used to express those altered in their figure by particles of iron. These are of a rhomboidal form, and composed only of six planes. Of this genus there are four known species: 1. A colourless, pellucid, and thin one, found in considerable quantities among the iron ores of the forest of Dean in Gloucestershire, and in other the like places. 2. A dull, thick, and brown one, not uncommon in the same places with the former. And 3. a black and very glossy kind, a fossil of very great beauty, found in the same place with the others, as also in Leicestershire and Suffex. See the article CRYSTAL.

SIDERITES, in natural history, the same with the magnet. See MAGNET.

SIDERITIS, **IRON-WORT**, in botany, a genus of the didynamia-gymnospermia class of plants, with a monopetalous, labiated, and ringent flower; the seeds are

four in number, and contained in the cup, which serves instead of a capsule; add to this, that the flowers grow in circles round the stalks, at the joinings of the leaves. See plate CCL. fig. 4.

SIDEROCHITA, in natural history, a name which Dr. Hill gives to a class of fossils of a moderately firm and compact texture, and crustated structure, composed of a ferrugineous, mixed with earthy matter, and formed of repeated incrustations, making so many coats or crusts round a softer or harder nucleus; or round loose earths, or an aqueous fluid. Of this class there are two orders, and under these four genera. The first order is of those siderochita which contain regular and solid nuclei, and comprehends the empherepyra, and the heteropyra. The second order is of those siderochita, which contain no solid nucleus but loose earthy matter, in form of powder, or an aqueous fluid, and comprehends the godes and the enhydrie. See the article EMPHEREPYRA, &c.

SIDEROXYLUM, in botany, a genus of the pentandria-monogynia class of plants, the flower of which consists of a single petal, divided into five roundish, erect, and concave segments; the fruit is a roundish berry, with two cells, in which are contained four seeds.

SIDMOUTH, a port-town of Devonshire, situated on a bay of the English channel, ten miles south east of Exeter.

SIDON, or **SAYD**, a port-town of Palestine, in asiatic Turkey, seventy miles north of Jerusalem. It is still a place of some consideration, being the residence of a turkish bashaw.

SIDRA, an island of the Archipelago, situated at the entrance of the gulph of Napoli.

SIEGE, in the art of war, the encampment of an army before a fortified place, with a design to take it.

The method of encamping is very different in a siege, from that observed on a march; as in the former the army environs the place, without cannon-shot, that nothing may enter. If the place be situated on a river, a detachment is sent to the other side, and bridges of communication made, both above and below the town. The army also encamp with their backs to the town, with the battalions and squadrons interlined: and having taken possession of all the heights, whence the enemy may be annoyed, the engineers trace the lines of circumvallation and contra-

contravallation; every regiment working at the place appointed them. See the articles CIRCUMVALLATION and CONTRAVALLATION.

When the general has disposed his guards, as well towards the place as towards the country, and established the lieutenant-generals to command in the particular quarters, he goes with the engineers to view the place, and orders the attack in the place judged the weakest. See the article APPROACH.

To form a siege, there must be an army sufficient to furnish five or six reliefs for the trenches, pioneers, guards, &c. also artillery, and magazines furnished with a sufficient quantity of ammunition and provisions; and an hospital, for taking care of the wounded.

To raise a siege, is to give over attacking a place; ordering the works and posts before it to be levelled.

SIEGEN, a city of Germany, thirty miles north of Nassau.

SIEGENBERG, a town of Westphalia, fifteen miles south-east of Cologne.

SIENNA, a city of Italy, in the duchy of Tuscany, situated thirty-six miles south of Florence.

SIERRA LEON, a river of Guinea, which falls into the Atlantic ocean, in west long. 14° , and north lat. 7° .

SIEVE, or SEARCE, an instrument serving to separate the fine from the coarse parts of powders, liquors, and the like; or to cleanse pulse from dust, light grains, &c. It is made of a rim of wood, the circle or space whereof is filled with a plexus of silk, tiffany, hair, linen, wire, or even thin slices of wood. The sieves which have large holes are sometimes also called *siddles*, such as the coal or lime sieve; the garden-sieve, &c. When drugs are apt to evaporate, or to be passed through the sieve, it is usual to have it covered with a lid.

SIEUR, a title of respect among the French, like *maſſen* among us: it is much used by the lawyers, as also by superiors in their letters to inferiors.

SIGAN, a town of China, in the province of Xens: east longit. 108° , and north lat. 34° .

SIGESBECKIA, in botany, a plant of the syngeneſia - polygamia - superflua class, with a compound radiated flower, and tubulose hermaphrodite corollulæ on the disc; the receptacle of the seeds is paleaceous, and they have no down.

SIGETH, a town of lower Hungary, si-

tuated seventy-three miles south-west of Buda, and subject to the house of Austria.

SIGHT, or VISION, in optics. See the article EYE and VISION.

SIGHTS of a quadrant, &c. thin pieces of brass, raised perpendicularly on its side, or on the index of a theodolite, circumferentor, &c. They have each an aperture, or slit, up the middle, through which the visual rays pass to the eye, and distant objects are seen. See the articles QUADRANT, THEODOLITE, &c.

SIGILLATA TERRA, a kind of bole, called also lemanian earth. See the articles BOLE and LEMNOS.

SIGILLUM, a SEAL. See SEAL.

SIGISTAN, the capital of a province of the same name, in Persia: east long. 62° , and north lat. 31° .

SIGN, *ſignum*, in general, the mark or character of something absent or invisible. See the article CHARACTER.

Among physicians, the term sign denotes some appearance in the human body, which serves to indicate or point out the condition of the patient, with regard to health or diseases. See INDICATION, DISEASE, &c.

SIGN, in algebra, denotes a symbol or character. See the article CHARACTER.

Mr. Mac Laurin observes, that the use of the negative sign, in algebra, is attended with several consequences that a first sight are admitted with difficulty, and has sometimes given occasion to notions that seem to have no real foundation. This sign implies that the real value of the quantity represented by the letter to which it is prefixed, is to be subtracted, and it serves with the positive sign, to keep in view what elements or parts enter into the composition of quantities and in what manner, whether as increments, or decrements, (that is, whether by addition or subtraction) which is, of the greatest use in this art. See the article POSITIVE.

In consequence of this, it serves to express a quantity of an opposite quality to the positive, as a line in a contrary position; a motion with an opposite direction; or a centrifugal force in opposition to gravity; and thus often saves the trouble of distinguishing, and demonstrating separately, the various cases of proportions, and preserves their analogy in view. As the proportion of line depends on their magnitude only, without regard to their position; and motions

and

and forces, are said to be equal, or unequal, in any given ratio, without regard to their directions : and, in general, the proportion of quantities relates to their magnitude only, without determining whether they are to be considered as increments or decrements ; so there is no ground to imagine any other proportion of $-b$ and $+a$, (or of -1 and 1) than that of the real magnitudes of the quantities represented by b and a , whether these quantities are, in any particular case, to be added, or subtracted. It is the same thing to subtract a decrement as to add an equal increment, or to subtract $-b$ from $a - b$, as to add $+b$ to it : and because multiplying a quantity by a negative number implies only a repeated subtraction of it, the multiplying $-b$ by $-n$, is subtracting $-b$ as often as there are units in n ; and is therefore equivalent to adding $+b$ so many times, or the same as adding $+nb$. But if we infer from this, that 1 is to $-n$ as $-b$ to nb , according to the rule, that unit is to one of the factors as the other factor is to the product, there is no ground to imagine that there is any mystery in this, or any other meaning than that the real magnitudes represented by 1 , n , b , and nb are proportional. For that rule relates only to the magnitude of the factors and product, without determining whether any factor, or the product, is to be added, or subtracted. But this likewise must be determined in algebraic computations ; and this is the proper use of the rules concerning the signs, without which the operation could not proceed. Because a quantity to be subtracted is never produced in composition, by any repeated addition of a positive, or repeated subtraction of a negative, a negative square-number is never produced by composition from the root. Hence $\sqrt{-1}$, or the square root of a negative, implies an imaginary quantity ; and, in resolution, is a mark, or character of the impossible cases of a problem, unless it is compensated by another imaginary symbol, or supposition, when the whole expression may have a real signification. Thus $1 + \sqrt{-1}$, and $1 - \sqrt{-1}$ taken separately, are imaginary, but their sum is 2 ; as the conditions that separately would render the solution of a problem impossible, in some cases destroy each other's effect, when conjoined. In the pursuit of gene-

ral conclusions, and of simple forms for representing them, expressions of this kind must sometimes arise where the imaginary symbol is compensated in a manner that is not always so obvious. See QUANTITY, POWER, &c.

By proper substitutions, however, the expression may be transformed into another, wherein each particular term may have a real signification, as well as the whole expression. The theorems that are sometimes briefly discovered by the use of this symbol, may be demonstrated without it, by the inverse operation, or some other way ; and though such symbols are of some use in the computations by the method of fluxions, its evidence cannot be said to depend upon arts of this kind.

SIGN, in astronomy, a constellation containing a twelfth part of the zodiac, or 30° . See the article ZODIAC.

The names of the signs, in the order wherein they follow each other, are aries, taurus, gemini, cancer, leo, virgo, libra, scorpio, sagittarius, capricornus, aquarius, pisces. See the articles ARIES, TAURUS, GEMINI, &c.

The three first of these signs are called the vernal, or spring-signs ; the next three, cancer, leo, virgo, the æstival, or summer-signs ; libra, scorpio, and sagittarius, the autumnal signs ; and capricornus, aquarius, pisces, the brumal, or winter-signs. The vernal and æstival signs are also called the northern, and the autumnal and brumal the southern signs.

SIGN-MANUAL, in law, is used to signify any bill, or writing, signed by the king's own hand.

SIGNALS, certain signs agreed upon, for suddenly conveying intelligence to places, to which the voice cannot reach. Thus, in some countries fires are lighted upon the hills, at the approach of danger : and at the beginning of a battle or an attack, signals are usually made with drums and trumpets. At sea they are given by firing cannon, or musquets ; by lights, flags, sails, &c.

Signals at sea are made by the admiral or commander in chief of a squadron, either in the day, or by night, whether for sailing, fighting, or the better security of the merchant-ships under their convoy : these are very numerous and important, being all appointed and determined by the lords of the admiralty, and communicated in the instructions sent to the commander of every ship of the fleet or squadron, before

before their putting to sea. Some of the principal of which are as follow: when a commander in chief would have them unmoor, he loses his main-top-sail, and fires a gun, which, in the royal navy, is to be answered by every flag-ship, and every ship is to get under sail as soon as she can. When, in bad weather, he would have them wear, and bring to the other tack, he hoists a pendant on the ensign-staff, and fires a gun: then the leeward-most and stern-most ships are to wear first, and bring on the other tack, and lie-by, or go on with an easy sail, till he comes a head. When any ship discovers land, he is to hoist his jack and ensign, and keep it abroad till the admiral answer him by hoisting his, on sight of which he is to hawl down his ensign. If any discovers danger, he is to tack and bear up from it, and to hang his jack abroad from the main-top-mast cross-trees, and to fire two guns: but if he should strike or stick fast, then, besides the same signal with his jack, he is to keep firing, till he sees all the fleet observe him, and endeavour to avoid the danger. When the admiral would have the vice-admiral to send out ships to chase, he hoists a flag striped white and red on the flag-staff at the fore-top-mast-head, and fires a gun: but if he would have the rear-admiral do so, he hoists the same signal on the flag-staff at the mizen-top-mast-head, and fires a gun. When he would have them give over chase, he hoists a white flag on his flag staff at the fore-top-mast head, and fires a gun; which signal is also to be made by that flag-ship which is nearest the ship that gives chase, till the chasing ship sees the signal. When the admiral would have the fleet prepare to anchor, he hoists an ensign striped red, blue, and white, on the ensign-staff; and fires a gun; and every flag-ship makes the same signal. Besides these, there are many other signals used by day; and different signals, upon these and other occasions, used by night: and others also when a fleet sails in a fog; all of which are to be found in the Book of Signals.

The signals for managing a sea-fight are also very numerous, the principal of which are as follow: when the admiral would have the fleet form a line of battle, one ship a-head of another, he hoists an union-flag at the mizen-peek, and fires a gun; and every flag-ship does the like. But when they are to form a line of battle

one a-breast of another, he hoists a pendant with the union-flag, &c. When he would have the admiral of the white, or he that commands in the second post, to tack, and endeavour to gain the wind of the enemy, he spreads a white flag under the flag at the main-top-mast-head, and fires a gun: and when he would have the admiral of the blue do so, he does the same with the blue flag. If he would have the vice-admiral of the red do so, he spreads a red flag from the cap, on the main-top-mast-head downward on the back-stay; if the vice admiral of the blue he spreads a blue flag, and fires a gun: if he would have the rear-admiral of the red do so, he hoists a red flag at the flag-staff at the mizen-top-mast head; if the rear admiral of the white, a white flag; if the rear admiral of the blue, a blue flag, and under it a pendant of the same colour with a gun. If he would have him that commands in the second post of his squadron, to make more sail, he hoists a white flag on the ensign-staff; but if he that commands in the third post be to do so, he hoists a blue flag, and fires a gun; and all the flag-ships must make the same signal. Whenever he hoists a red flag on the flag-staff at the fore-top-mast-head, and fires a gun, every ship in the fleet must use their utmost endeavour to engage the enemy in the order preferred. When he hoists a white flag on his mizen-peek, and fires a gun, all the small frigates of his Squadron, that are not of the line of battle, are to come under the stern. If the fleet be sailing by a wind in the line of battle, and the admiral would have them brace their head sails to the mast, he hoists up a yellow flag on the flag staff at the mizen-top-mast-head, and fires a gun, which the flag-ships are to answer, and then the ships in the rear are to brace first. After this, if he would have them fall their head-sails, and stand on, he hoists a yellow flag on the flag-staff at the fore-top-mast-head, and fires a gun, which the flag-ship must answer; and then the ships in the van must fall first and stand on. If, when this signal is made, the red-flag at the fore-top-mast-head be abroad, he spreads the yellow flag under the red flag. If the fleets be near one another, the admiral would have all the ships to tack together, the soonest to lie in a posture to engage the enemy, he hoists an union-flag on the flag-staff at the fore and mizen-top mast-heads, and fires a gun; and all the flag ships are

do the same. The fleet being in a line of battle, if he would have the ship that leads the van, hoist, lower, set, or haul-up any of his sails, he spreads a yellow flag under that at his main-top-mast-head, and fires a gun; which signal the flag-ships are to answer: and the admiral will hoist, lower, set, or haul-up the sail, which he would have the ships that lead the van do; which is to be answered by the flag-ships of the fleet. When the enemies run, and he would have the whole fleet follow them, he makes all the sail he can after them himself, takes down the signal for the line of battle, and fires two guns out of his fore-chase, which the flag-ships answer; and then every ship is to endeavour to come up with, and board the enemy. When he would have the chase given over, he hoists a white-flag at the fore-top-mast-head, and fires a gun. If he would have the red squadron draw into a line of battle, one a-breast of another, he puts abroad a flag striped red and white on the flag-staff at the main-top-mast-head, with a pendant under it, and fires a gun: if the white or second squadron is to do so, the flag is striped red, white, and blue: if the blue or third squadron is to do so, the flag is a genoeese ensign and pendant: but if they are to draw into a line of battle one ahead of another, the same signals are made without a pendant. If they are to draw into the line of battle one astern of another, with a large wind, and he would have the leaders go with the starboard-tacks aboard by the wind, he hoists a red and white flag at the mizen-peak, and fires a gun: but if they should go by the larboard-tacks aboard the wind, he hoists a genoeese flag at the same place: which signals, like others, must be answered by the flag-ships.

SIGNATURE, a signing of a person's name at the bottom of an act or deed, wrote by his own hand.

SIGNATURE of the court of Rome, is a supplication answered by the pope, whereby he grants a favour, dispensation or collation to a benefice, by putting the fiat to it with his own hand; or the consensus is written in his presence. This signature at the bottom of the supplication, gives the name to the whole instrument.

SIGNATURE, in printing, is a letter put at the bottom of the first page at least, in each sheet, as a direction to the binder, in folding, gathering, and collating them.

The signatures consist of the capital letters of the alphabet, which change in every sheet: if there be more sheets than letters in the alphabet, to the capital letter is added a small one of the same sort, as A a, B b; which are repeated as often as necessary. In large volumes it is usual to distinguish the number of alphabets after the first three or four, by placing a figure before the signature as 5 B, 6 B, &c.

SIGNATURE is also used, by some naturalists, for the resemblance a vegetable or mineral bears to a part of the human body; which, by some fantastical people, is supposed to indicate its virtues and use.

SIGNET, one of the king's seals, made use of in sealing his private letters, and all grants that pass by bill signed under his majesty's hand: it is always in the custody of the secretaries of state. See the article **SECRETARY**.

SIGNIFICATION, in general, denotes the meaning of a sign, word, phrase, and the like.

In law, it is used for the notifying an act, &c. to the opposite party, by a copy thereof given and attested by the proper officer.

SIGNIFICAVIT, in law, a writ which issues out of the court of chancery, on a certificate given by the ordinary of a person's standing excommunicated forty days, in order to have him imprisoned till he submits to the authority of the church. See **EXCOMMUNICATION**.

SIGNING, in law. See **SIGNATURE**.

SIGUENCA, a city of old Castile, in Spain, sixty miles north-east of Madrid.

SILENE, SMALL-FLOWERED CAMPION, in botany, a genus of the decandria-trigynia class of plants, the flower of which consists of five petals; and its fruit is cylindraceous, divided into three or five cells, and containing numerous kidney-shaped seeds.

SILESIA, a duchy belonging to the king of Prussia, two hundred miles long, and seventy broad: it is bounded by Brandenburg on the north, by Poland on the east, by Hungary on the south, and by Moravia and Bohemia on the west.

SILESIAN-EARTH, *terra silesiaca*, in the materia medica, a fine astrigent bole, called by some authors *axungia solis*. It is very heavy, of a firm compact texture, and in colour of a brownish yellow. It breaks easily between the fingers and does not stain the hands, is

naturally of a smooth surface, and is readily diffusible in water, and melts freely into a butter-like substance in the mouth. It leaves no grittiness between the teeth, and does not ferment with acid menstrua. These are the characters by which it is known from all other earths of a like colour. It is found in the perpendicular fissures of rocks near the gold-mines at Strigonium in Hungary, and is supposed to be impregnated with the sulphur of that metal. It is, however that be, a good astringent, and better than most of the boles in use.

Montanus gives us a high character of its virtues, and says, it is gold transmuted by nature into an admirable medicine. Senertus commends it as excellent against malignant fevers, diarrhoeas, &c. Agricola tells us, that the spirit of this earth dissolves gold, as well as aqua regia, though more slowly, into a red solution; which, in a few days, precipitates the gold in fine powder. He also mentions another earth found at Westerwald, preferable to this Silesian earth.

SILEX, the *flint*, in natural history. See the article **FLINT**.

SILICUA, a term used by botanists to denote a pod. See the article **POD**.

SILICUA is also a name given to the ceratonia. See the article **CERATONIA**.

SILICOSE PLANTS, those which produce pods, and are otherwise called leguminous. See the article **LEGUME**.

SILISTRIA, a city of european Turkey, in the province of Bulgaria, ninety miles east of Nissa: east long. 25° , north lat. $42^{\circ} 40'$.

SILK, *sericum*, in natural history, is properly an animal fluid, hardened by the air; being an extremely soft and glossy thread, spun by the bombyx or silk-worm, the body of which consists of eleven rings: it produces a species of phalænæ or moths, with pectinated wings, but no tongue. See **PHALÆNA**.

The humours, found in the body of this insect, approach to the nature of silk; since, on being rubbed in the hand, they leave a solid crust behind. In the sides of the belly, all about the ventricle, there are deposited a vast number of vessels, which contain the silky juice; these run with various windings and meanders to the mouth, and are so disposed, that the creatures can discharge their contents at pleasure at the mouth; and according to the nature of the

juices, that they are supplied with, furnish different sorts of silk from them, and the fluid contents of these vessels hardening in the air into that sort of thread that we find the web, or balls of the creature consist of.

As soon as the silk-worm is arrived at the size and strength necessary for beginning his cod, he makes his web; for it is thus they call that slight tissue, which is the beginning and ground of this admirable work. This is his first day's employment. On the second, he forms his folliculus or ball, and covers himself almost over with silk. The third day he is quite hid, and the following days employs himself in thickening and strengthening his ball, always working from one single end, which he never breaks by his own fault, and which is so fine, and so long, that those who have examined it attentively, think they speak without compass, when they affirm, that each ball contains silk enough to reach the length of six english miles.

In ten days time the ball is in its perfection, and is now to be taken down from the branches of the mulberry-tree where the worms have hung it. But this point requires a deal of attention, for there are some worms more lazy than others, and it is very dangerous waiting till they make themselves a passage, which usually happens about the fifteenth day of the month.

The first, finest, and strongest balls are kept for the grain, the rest are carefully wound; or if it is desired to keep them all, or if there be more than can be well wound at once, they lay them for some time in an oven moderately hot, or else expose them, for several days successively, to the greatest heats of the sun, in order to kill the insect, which, without this precaution, would not fail to open itself a way to go and use those new wings abroad, it has acquired within.

Ordinarily, they only wind the more perfect balls; those that are double, or too weak, or too coarse, are laid aside, not as altogether useless, but that, being improper for winding, they are reserved to be drawn out into skeins. The balls are of different colours; the most common are yellow, orange-colour, isabella, and flesh-colour; there are some also of a sea-green, others of a sulphur-colour, and others white; but there is no necessity for separating the colours and

shades

shades to wind them apart, as all the colours are to be lost in the future scouring and preparing of the silk.

In the Philosophical Transactions, n^o 252, we find the following observations concerning the goodness of silk, which is best distinguished by its lightness. The organic silk is the best of any made in the country of Piedmont, and two threads are equal in fineness, that is in smoothness, thickness, and length, for the thread of the first twist. For the second, it matters not whether the single thread be strong before the two are joined, unless to see whether the first twist prove well. It is necessary that the silk be clean; and it is to be observed, that the straw-coloured is generally the lightest, and the white the heaviest of all. The skains should be even, and all of an equality, which shews that they were wrought together; otherwise we may with justice suspect that it is refuse silk, and cannot be equally drawn out and spun, for one thread will be shorter than the other, which is labour and loss.

It will also be requisite to search the bale more than once, and take from out of the parcels a skain to make an essay; for unless it be known by trial what one buys, there is the greatest danger of being cheated in this commodity. To make an estimate, and know the lightness, fix the essay upon one eighth of a portée, or hand of silk of a hundred and ten aunes or ells of Lyons in length, and see what it makes of aunes by the eighth part. The skain, which is of eight threads, must be multiplied by a hundred and ten aunes of Lyons, and from this number must be deducted one eighth; as for example, 110 by 80 makes 8800, the eighth part of which is 1100; and this is the eighth part of a portée, or hand of silk. Now to calculate what these 1100 aunes weigh, which is the eighth part of a portée, or of 210 aunes of Lyons, it will be proper to take a skain out of the parcels, which you take from out of the bale which you judge may contain, at least, 1100 aunes, to make the one eighth part of a portée, which portée must be divided on two bobbings, half on each; then fix the two bobbings on the center, or beam, and from thence pass it through the comb hurdissoir, viz. 550 from the two bobbings, will make 1100, which will be one eighth part of what you desire to know. This done, you cut off your

silk, and carry it to put on the hurdissoir; then weigh it, and multiply the weight by eight, it will weigh just as much as a portée of 110 aunes of Lyons, which is the general rule for calculating. When they draw the silk out by this means, one may learn to adjust the weight.

There are silks of Piedmont, which are very light and clean, and are to be preferred before any on the sale: the portée of silk of the lightest weighs near twenty-four penny-weights, and from this it arises in gravity to twenty-five, and twenty-six penny-weights the portée, and sometimes to twenty-seven and twenty-eight; but even these weights may be dispensed with, provided that the other qualities be good, that is, that it be well wrought, even and clean. When the silk is more than twenty-eight penny-weights the portée, it must always be proportionably cheaper.

Methods of preparing SILKS. The several preparations which silks undergo to fit them to be used in the manufacture of silken stuffs, are reeling, spinning, milling, bleaching, and dyeing. To wind silks from off the balls, two machines are necessary; the one a furnace, with its copper; the other a reel, or frame, to draw the silk. The winder, then seated near the furnace, throws into the copper of water over the furnace (first heated and boiled to a certain degree, which custom alone can teach) a handful or two of balls, which have been first well purged of all their loose furry substance. She then stirs the whole very briskly about with birchen rods, bound and cut like brushes; and when the heat and agitation have detached the ends of the silks of the pods, which are apt to catch on the rods, she draws them forth, and joining ten or twelve, or even fourteen of them together, she forms them into threads, according to the bigness required to the works they are destined for: eight ends sufficing for ribbands; and velvets, &c. requiring no less than fourteen. The ends; thus joined into two or three threads, are first passed into the holes of three iron-rods, in the fore-part of the reel, then upon the bobbings, or pullies, and at last are drawn out to the reel itself, and there fastened; each to an end of an arm or branch of the reel. Thus disposed, the winder, giving motion to the reel, by turning the handle, guides the threads; substitutes new ones, when any of them break, or any of the balls are wound out; strengthens them, where

necessary, by adding others; and takes away the balls wound out, or that, having been pierced, are full of water. See plate CCXLIX.

In this manner, two persons will spin and reel three pounds of silk in a day; which is done with greater dispatch than is made by the spinning-wheel or distaff. Indeed, all silks cannot be spun and reeled after this manner; either by reason the balls have been perforated by the silk-worms themselves, or because they are double, or too weak to bear the water; or because they are coarse, &c. Of all these together, they make a particular kind of silk, called *floretta*; which being carded, or even spun on the distaff, or the wheel, in the condition it comes from the ball, makes a tolerable silk.

As to the balls, after opening them with scissars, and taking out the insects (which are of some use for the feeding of poultry) they are steeped three or four days in troughs, the water whereof is changed every day to prevent their stinking. When they are well softened by this scouring, and cleared of that gummy matter the worm had lined the inside withal, and which renders it impenetrable to the water, and even to air itself, they boil them half an hour in a lye of ashes, very clear and well strained; and after washing them out in the river, and drying them in the sun, they card and spin them on the wheel, &c. and thus make another kind of *floretta*, somewhat inferior to the former.

As to the spinning and reeling of raw silks off the balls, such as they are brought from Italy and the Levant, the first is chiefly performed on the spinning-wheel; and the latter, either on hand-reels, or on reels mounted on machines, which serve to reel several skains at the same time. See the article REEL.

As to the milling, they use a mill composed of several pieces, which may mill two or three hundred bobbins at once, and make them into as many skains.

For the dyeing of silks. See DYEING.

SILK, in medicine, is very little used for medicinal purposes; though if the bags were burnt in a close vessel, in the same manner as sponge, they would undoubtedly prove a medicine of similar, and probably of superior virtue: they yield a larger quantity of volatile salt, than any other animal substance we know of; and the spirit of raw silk, rectified with some essential oil, makes the medi-

cine known by the name of english drops. See the article DROPS.

Spider SILK, that prepared off the webs of spiders; which, according to Reaumur is inferior to that obtained from the bag of the silk-worm, both in strength and lustre.

Duties upon SILKS. Raw long silks of all sorts, except from Bengal, pay, on importation, a duty of 1s. 11 $\frac{1}{100}$ d. the pound, containing twenty-four ounces and draw back on exportation, 1s. 8 $\frac{2}{100}$ d. Bengal raw-silk pays, on importation

2s. 4 $\frac{72\frac{1}{2}}{100}$ d. the pound of twenty-four ounces; and draws back, on exportation

2s. 1 $\frac{87\frac{1}{2}}{100}$ d. Raw short silk pays, on im-

portation, only 1s. 3 $\frac{40}{100}$ d. the pound of twenty-four ounces; and draws back on exportation, 1s. 1 $\frac{1}{2}$ d. Satin-silk pays, on importation, by the pound of sixteen ounces, 7s. 8 $\frac{40}{100}$ d. and draw back, on exportation, 6s. 9 d. But raw silks, imported directly from any of the british american plantations, and of the growth of the same, pay no duty at all.

Thrown silk, dyed, pays, on importation by the pound of sixteen ounces, a duty of 19s. 3 d. and, on being exported, draw back 16s. 10 $\frac{50}{100}$ d. As to manufactures or wrought silks, french alamodes or lustrings, pay, on importation, by the pound of sixteen ounces, 2l. 15s. 10 $\frac{37}{100}$ d. but if not french, only 1l. 15s. 10 $\frac{32}{100}$ d. Indian wrought silks, imported in british shipping, and duly entered at the port

of London, pay only 4 $\frac{72\frac{1}{2}}{100}$ d. the pound

of sixteen ounces. Wrought silks of the manufacture of Italy, imported in british ships, pay 12s. 1 $\frac{55}{100}$ d. the pound of sixteen ounces; and draw back, on exportation,

11s. 7 $\frac{21\frac{3}{4}}{100}$ d. All french wrought

silks, except alamodes and lustrings pay, on importation, only 1l. 7s. 11 $\frac{1}{100}$ d. the like pound; and draw back, on exportation, 17s. 3 $\frac{56}{100}$ d. Wrought silks except alamodes and lustrings, from any part of the world, pay, on importation only 14s. 2 $\frac{1}{100}$ d. the like pound; and draw back, on exportation, 13s. 6 $\frac{56}{100}$ d. Flowered silks, or those mixed with gold or silver, except of India, Persia, or China

pay, on importation, 1l. 1s. 6 $\frac{40\frac{1}{2}}{100}$ d. the





like pound; and draw back, on exportation, 19s. 10 $\frac{45\frac{1}{2}}{100}$ d.

SILLON, in fortification, the same with envelope. See **ENVELOPE**.

SILPHIUM, in botany, a genus of the Syngenesia-polygamia-necessaria class of plants, the general corolla whereof is radiated with a great number of hermaphrodite floscules in the disc, and with a fewer number of the female ones in the radius: the partial corolla of the hermaphrodite is monopetalous, infundibuliform, and quinque-dentated; there is no pericarpium; the female seed is solitary, membranaceous, and obversely cordated.

SILVER, *argentum*, Δ , in natural history, the purest and most fixed of all metals, except gold, for the specific gravity of which, see the article **GRAVITY**.

Silver, though frequently found native and pure, is however often found in the state of ore; as among the grey ores of copper, the ore of lead, of cobalt, antimony, and other mineral bodies. The proper and peculiar ores of silver are of various appearances; as in that of a soft substance of a blackish blue colour, greatly resembling lead: another ore of silver is in form of brown or brownish-yellow obscurely transparent masses, not a little resembling the coarser sorts of amber: there is another silver-ore of a very bright and beautiful red, a smooth even surface, and considerably pellucid, resembling very much native sandarach. These are the more usual and determinate ores of silver, which in many of the german mines are blended all together, sometimes with the black kind wholly covering the red: the black kind is often soft enough to be cut with a knife.

The method of precipitating silver out of an easily fusible ore is this: pound the ore very fine in an iron-mortar, and for an assay weigh one decimastical centner of it, and eight centners of granulated lead; pour into a new test about half the lead, stir it about with a finger, and spread it over the cavity of the test; put upon this lead the pounded ore, and then cover it with the remainder of the lead; put the test, thus loaded, under the muffle of an assay-furnace, and in the hinder part of it make the fire, and increase it to a considerably high degree. The ore will soon be raised out of the melted lead, and swim upon it; a little after it will grow clammy, melt, and be thrown toward the border of the test; then

the surface of the lead will appear clear in the middle of the test, and will smother and boil; the fire must now be made a little less, till the boiling ceases, for a quarter of an hour, and then made violent again, and the surface of the lead will then diminish by degrees, and be covered with a mass of scorice. At this time have at hand an iron hook ready heated, and with this stir all the matter from the sides into the middle of the test; if the matter, adhering to the hook from the stirring, melts quickly again, and the extremity of the hook, when cold, is found covered with a shining crust, the scorification is perfected; but if the scorice feel clammy while stirred, and adhere in quantity to the hook, and are of a rough surface, the scorification is not perfect, but the matter adhering to the hook must be struck off with a hammer, and beat to powder, and returned into the test, and the fire continued till the scorification is perfected; then take out the test, and pour the whole contents into a mould, heated and greased. This is the first process, and this usually takes up three quarters of an hour: the silver is now in form of a regulus, and must be separated by the coppel in the usual way. See the article **COPELLING**.

When silver-ores are rendered refractory by an admixture of mundic, they must be pounded and put into a covered test, which is to be placed in an assay-furnace under a muffle, till all the mundic is evaporated; which you may know by the cessation of the smoke from the ore: let this roasted ore cool leisurely; then powder it fine, and mix it with an equal quantity of glass of lead reduced likewise to fine powder; and, lastly, scorify the whole till the silver appear in the form of a bright bead in the middle of the test.

When the silver is well purified, so that all heterogenous matter, either metallic or other, that might be mixed with it, is extracted, they say it is twelve carats fine. This is the expression they use to denote the quality of the purest silver, without any mixture or alloy; but, if there should remain any, they deduct the weight of the mixture from the principal weight, and the remainder shews the value of the silver. The carat consists of twenty-four grains: so that, when to the weight of twelve carats there are twelve grains of mixture, the value of the silver is eleven carats twelve grains; and so of any other.

Silver,

Silver, though considerably hard in comparison of lead or gold, is yet malleable and ductile to a very great degree, and may be drawn out into an extremely fine wire. It is less capable of rust than any other metal, except gold; but it readily becomes black on being rubbed with sulphur. It requires a middle degree of fire to fuse it; bearing unaltered a stronger degree of heat than either lead or gold, but melting much more easily than copper or iron. It, indeed, grows red-hot, but then melts immediately. It amalgamates readily enough with mercury; the readiest way of mixing them is to have the silver in fine filings, very clear from grease, and to rub it in a mortar with the mercury. It is fixed in a common fire, so as to lose scarce any thing; and perhaps, truly speaking, not any thing at all, in the fiercest degree of it, if never so long continued: it has been tried by Boerhaave for two months together, in the eye of a glass-house-furnace and found to lose only one twelfth part of its weight in the operation; and it is highly probable, that even this loss might be owing to the silver's not being perfectly purified at first.

Silver, exposed to the fiercest fire, collected in the focus of a large burning-glass, immediately becomes red-hot, and melts; it then crackles, and afterwards emits a thick smoke: soon after this, it is covered with a dusty substance, or calx. If the silver have been refined by means of antimony, the calx is of a yellowish hue, and, if kept long enough in the focus, it will vitrify in the same manner as gold; but, if it have been refined with lead, the calx is whiter, and, Homberg assures us, will never vitrify, however long exposed, even to that degree of heat.

Silver is purified by means of lead, and bears its action without loss. Fused with antimony, if the effect be not carefully prevented, it turns to scoria, and becomes volatile: there is no metal, indeed, except gold alone, that bears the test with this rapacious mineral, in the common way. See the article GOLD.

The proper solvent of silver is aqua fortis; it is dissolved readily by this, and not at all by the common aqua regia; yet, under certain circumstances, aqua regia will dissolve silver: the first phlegm which arises in distilling that menstruum, when newly made, and when it has been

some time in digestion with gold, will dissolve silver, and will not touch gold though it cannot but be acknowledged this liquor is as much aqua regia, as what follows in the distillation. This, however, is an experiment of mere curiosity not likely ever to occur in the way of business, and in that respect, though we are acquainted with this accident, which was discovered by Homberg, we may say in general, that aqua fortis dissolves silver, and not gold; and aqua regia dissolves gold, and not silver. If but the smallest quantity of sea-salt be put into aqua fortis, it will no longer give a clear solution of silver. This gives us a test for the goodness of aqua fortis: and to this difference in the effect of these two menstrua we owe the only method of separating silver from gold, without loss. If silver be fused with lead, it loses its sound, and its bright colour; if melted with tin, it becomes extremely brittle, and the two metals are very difficultly separated again. It melts and mixes easily with copper, and by that means acquires a hardness which fits it for our coins and utensils, much better than in its pure natural state. See the article ASSAYING.

Silver, melted with arsenic (which is easily done by mixing the arsenic with a little chalk and a little tartar, then wetting it with common water, and then stratifying the silver with the mass) receives a part of that substance into its own body, and shews the singular effect it has on it, in its losing all its malleability; but the arsenic may be separated from it again by only melting it in a strong fire.

Silver, melted with bismuth, is afterwards much the more easily amalgamated with quicksilver; and what is yet more remarkable, is, that it by this means becomes so attenuated, that it will pass through a leather in much larger quantity mixed with the mercury, than it would otherwise have done. It is made much more fusible, as well as volatile, by antimony, and is strangely debased by the fume of burning sulphur. Silver is said by some to be able to colour the natural gems, and factitious glasses, and pastes with a fine blue; but this is an error wholly owing to the alloy of copper, which is in most silver, and which has occasionally shewn this effect in the artificial products of this kind. But though silver is not capable of com-

muat.

municating any colour to fossils, it has, however, a power of influencing their figure, and that in a very singular manner: it has long been known, that iron determines the crystals it enters the composition of, into rhombs, and lead into cubes; but it has not been known that these truncated crystals and spars, preserved as great curiosities in the cabinets of the curious, owe their figure to silver, till silver was lately separated from them. As certainly, therefore, as iron or lead can form crystal into cubes and rhombs, so certainly can silver, even in a very small quantity, influence the figure of those fossils, and form them into columns truncated at each end.

If silver be melted with common salt, it blends with proper management into a semipellucid mass, called *luna cornea*; which is very difficultly reduced into silver again, as being so volatile as to fly wholly off in a small degree of heat.

The chemists, who suppose silver to have some peculiar affinity to the moon, therefore call it *luna*: their character for it is D ; by which they mean to denote the half of gold, whose character is a complete circle; the inner line of this figure, if turned outward, would make it the complete mark of gold.

Refining of SILVER. See *REFINING*.

Medicinal virtues and preparations of SILVER. The chemists have said great things of the virtues of silver, and, accordingly, have endeavoured to introduce a long train of lunar medicines; such as *argentum potabile*, *diaphoreticum lunare*, *bezoardicum lunare*, and fifty others as pompous as insignificant: the only preparations of silver, which keep up their credit in the shops, are the lunar crystals and caustics. See the articles *CRYSTAL* and *CAUSTIC*.

As to the pretended tinctures of silver, being only tinctures of copper, they are by no means safe internally; and every coloured tincture of silver may be boldly declared to be of this kind.

The only preparation, therefore, we shall add, is, that liquor kept by many as a mighty secret for tinging hair of any colour to a fine black. It is thus prepared: take three drams of crude mercury, and dissolve it in an ounce and half of aqua fortis; add to this, two ounces of the solution of silver in aqua fortis, and pour the whole into a vessel of clean water, so much in quantity, that the liquor may not be able to cor-

rode copper, nor raise bubbles on its surface; and when it has stood a month, it may be used with safety. See the article *MERCURY*.

SILVER-LEAF, that beaten out into fine leaves for the use of the gilders, which is performed in the same manner as gold-leaf. See the article *GOLD-LEAF*.

SILVER-WIRE, that drawn out into fine wire; for the manner of doing which, see the article *GOLD-WIRE*.

Shell-SILVER, is prepared of the threads of silver-leaves, or of the leaves themselves, for the use of painters, after the same manner as shell-gold. See *GOLD*.

SILVER-TREE, *eugenia*, in botany, a small but beautiful tree of Jamaica, belonging to the icofandria-monogynia class of plants; its leaves are smooth, very thin, and grow in pairs; the flowers are small and whitish, and grow at the axæ of the leaves. See the article *EUGENIA*.

SILVERING, the covering of any thing with silver. It is usual to silver metals, wood, paper, &c. which is performed either with fire, oil, or size. Metal-gilders silver by the fire; painter-gilders all the other ways. See *GILDING*.

To silver copper or brass: 1. Cleanse the metal with aquafortis, by washing it lightly, and immediately throwing it into fair water; or by heating it red hot, and scouring it with salt and tartar, and fair water, with a small wire-brush. 2. Dissolve some silver in aquafortis, in a broad-bottomed glass vessel, or of glazed earth, then evaporate away the aquafortis over a chaffing-dish of coals. 3. Put five or six times its quantity of water, or as much as will be necessary to dissolve it perfectly, on the remaining dry calx; evaporate this water with the like heat; then put more fresh water, and evaporate again; and if need be, the third time, making the fire towards the latter end so strong, as to leave the calx perfectly dry, which, if your silver is good, will be of a pure white. 4. Take of this calx, common-salt, crystal of tartar, of each a like quantity, or bulk, and mixing well the whole composition, put the metal into fair water, and take of the said powder with your wet fingers, and rub it well on, till you find every little cavity of the metal sufficiently silvered over. 5. If you would have it richly done, you must rub on more of the powder, and in the last place wash the silvered metal in fair water, and rub it hard with a dry cloth.

SILVER-

SILVERING of glasses. See the article **FOLIATING of looking-glasses.**

SIMATIUM, or **SIMATSE**, in architecture. See the article **CYMATIUM**.

SIMEREN, a city of Germany, in the palatinate of the Rhine: east long. $7^{\circ} 5'$, north lat. 50° .

SIMIA, the **MONKEY**, in zoology, a genus of quadrupeds, of the order of the anthropomorpha, the characters of which are, that the face is naked, the claws rounded and flattish in some degree, like the nails on the human hand, and there is an eye-lid each way. See the articles **MONKEY** and **ANTHROPOMORPHA**.

This genus, among several other species, comprehends the satyr, the baboon, and the rat-ape. See **SATYR** and **BABOON**.

SIMILAR, in arithmetic and geometry, the same with like. Those things are said to be similar or like, which cannot be distinguished but by their comprehensiveness, that is, either by immediately applying the one to the other, or some other third to them both, so that there is nothing found in one of the similar things but is equally found in the other, notwithstanding their similitude may differ in quantity; and since in similar things there is nothing wherein they differ besides the quantity, quantity itself is the internal difference of similar things. In mathematics, similar parts have the same ratio to their wholes, and if the wholes have the same ratio to the parts, the parts are similar. See **PART**. Similar angles are also equal angles. In solid angles, when the planes under which they are contained are equal, both in number and magnitude, and are disposed in the same order, they are similar, and consequently equal. Similar arches of a circle are such as are like parts of their whole circumferences, and consequently equal. Similar plane numbers are those numbers which may be ranged into the form of similar rectangles, that is, into rectangles whose sides are proportional; such are 12 and 48, for the sides of 12 are 6 and 2, and the sides of 48 are 12 and 4; but $6:2::12:4$, and therefore those numbers are similar. Similar polygons are such as have their angles severally equal, and the sides about those angles proportional. Similar rectangles are those which have their sides about the equal angles proportional; hence, 1. All squares are similar rectangles. 2. All similar rectangles are to each other as the squares of their homo-

logous sides. Similar right-lined figures are such as have equal angles, and the sides about those equal angles proportional. Similar segments of a circle are such as contain equal angles. Similar curves: two segments of two curves are called similar, if, any right lined figure being inscribed within one of them, we can inscribe always a similar right line figure in the other. Similar conic sections: two conic sections are said to be similar when any segment being taken in the one, we can assign always a similar segment in the other. Similar diameters of two conic sections: the diameters in two conic sections are said to be similar when they make the same angles with their ordinates. Similar solids are such as are contained under equal number of similar planes alike situated. Similar triangles are such as have their three angles respectively equal to one another. Hence, 1. All similar triangles have the sides about their angles proportional. 2. All similar triangles are to one another as the squares of their homologous sides. See the articles **ANGLE**, **ARCH**, **NUMBER**, **POLYGON**, &c.

SIMILAR BODIES, in natural philosophy, are such as have their particles of the same kind and nature with one another. See **BODY**, **PARTICLE**, &c.

SIMILAR DISEASE, in medicine, denotes a disease of some simple, solid part of the body; as of a fibre with regard to its tension or flaccidity; of a membrane; a nervous canal, or the like. See **DISEASE**.

SIMILAR FIGURES, in geometry, such as have their angles respectively equal, and the sides, about the equal angles, proportional. See the articles **RECTANGLE**, **TRIANGLE**, and **POLYGON**.

SIMILAR PARTS, in anatomy, are those parts of the body which at first sight appear to consist of like parts, or parts of the same nature, texture, and formation; of these we usually reckon ten, *viz.* the bones, cartilages, ligaments, membranes, fibres, nerves, arteries, veins, flesh, and skin. See **BONE**, **CARTILAGE**, &c.

SIMILE, or **SIMILITUDE**, in rhetoric, a comparison of two things, which though different in other respects, yet agree in some one. The difference between a simile and comparison, is said to consist in this, that the simile properly belongs to whatever we call the quality of the thing, and the comparison to the quantity. See the article **COMPARISON**.

SIMILITUDE, in arithmetic, geometry, &c.

&c. denotes the relation of two things similar to each other. See **SIMILAR**.

SIMONICAL is applied to any person guilty of simony. See **SIMONY**.

SIMONIANS, in church history, a sect of ancient heretics, so called from their founder, Simon Magus, or the magician. The heresies of Simon Magus were principally his pretending to be the great power of God, and thinking that the gifts of the Holy Ghost were venal, and to be purchased with money. He is said to have invented the *Æons*, which were so many persons of whom the Godhead was composed. His concubine Helen, he called the first intelligence, and mother of all things; and sometimes he called her Minerva, and himself Jupiter. Simon Magus gained a great many profelytes, who paid himself and his concubine divine worship; these were the earliest heretics, and those that St. John, St. Peter and St. Paul, in their epistles, so often warn the christians against.

SIMONY, in ecclesiastical law, the crime of buying or selling spiritual gifts or preferments. In the ancient christian church, this crime was always thought to be committed when men either offered or received money for ordinations. The apostolical canons lay a double punishment both of deposition and excommunication, on such of the clergy as were found guilty of it. This was the first sort of simony, and that which was most properly so called, and to this the antients reduced the exacting of any reward for administering the eucharist or baptism, or for any spiritual offices. A second sort of simony consisted in buying the spiritual preferments of the church; this was punished with deposition in any bishop, who promoted any church officer for the sake of lucre; and the persons so promoted, were to be degraded from their office. By the laws of Justinian, every elector was to depose upon oath, that he did not chuse the person elected for any gift or promise, or friendship, or any other cause, but only because he knew him to be a man of the true catholic faith, of unblamable life, and good learning. This last sort of simony was, when men by ambitious arts and undue practices, got themselves invested in an office or preferment to which they had no regular call, or when they intruded themselves into other mens places, which were legally filled before. The casuists for the Church of Rome main-

tain, that all compacts or bargains in which benefices are concerned, are *simonical*, when it is done without the pope's concurrence; but that, once obtained, gives a sanction to the thing, which they found upon this universal proposition, that the pope cannot commit simony in beneficiary matters, since he hath a power so absolute over all the ecclesiastical goods and benefices, that he can unite, divide, and bestow them in whatever manner he pleases.

Against the corruption of simony, there have been many canons made in our own church, which punish the offender with deprivation, disability, &c. and by a statute of the 31 Eliz. it is enacted, that if any person for any sum of money, reward, gift, profit, or benefit, or by reason of any promise, agreement, grant, bond, covenant, or other assurance, shall present, or collate any person to any benefice with cure, dignity, or living ecclesiastical, every such presentation, or collation, and every admission or induction thereupon, shall be utterly void, and the crown shall present for that turn; and the person that shall give or take any sum of money, &c. shall forfeit double the value of one year's profit of any such benefice; and the person so corruptly taking any such benefice, shall from thenceforth be disabled to have and enjoy the same.

SIMPLE, *simplex*, something not mixed or compounded, in which sense it stands opposed to compound. See the article **COMPOUND**.

Thus we say, simple form, simple mode, simple fee, simple force, simple equation, simple anomaly, simple glands, simple vision, simple flank, simple fraction, &c. See the articles **FORM**, **MODE**, **FEE**, **FORCE**, **EQUATION**, &c.

SIMPLE, in pharmacy, a general name given to all herbs or plants, as having each its particular virtue, whereby it becomes a simple remedy.

SIMPLE, in music, is chiefly used in opposition to double, sometimes to a compound of several parts or figures of different values, &c. Simple cadence is that where the notes are equal in every part. Simple concords are those wherein we hear at least two notes in consonance, as a third and fifth, and of consequence at least three parts, which is either done immediately, and called the harmonical triad, or in a more remote manner; that is, when the sounds which are not bass,

are one or two octaves higher. This distance has no bad effect in the third; but in the fifth it has, and generally speaking, the nearer or more immediate the concords are, the better. They also say, C simple, or plain, in opposition to C accented. Simple counter-point is a harmonical composition, wherein note is set against note, in opposition to figurative counter-point. Simple fugue, or simple imitation, is where one part imitates the singing of another for some measures. See the articles COUNTER-POINT, IMITATION, FUGUE, &c.

For simple interval, and simple triple, see the articles INTERVAL and TRIPLE.

SIMPLEX BENEFICIUM, signifies an inferior dignity in a cathedral, or collegiate church, a sine-cure, pension, or any ecclesiastical benefice, opposed to a cure of souls, and which therefore is consistent with any parochial cure, without coming under the denomination of pluralities.

SIMPLIFYING, in ecclesiastical matters, is the taking away the cure of souls from a benefice, and dispensing the beneficiary from residence. Several benefices which have been simplified, now require residence, and a great number of others, which required residence, have been simplified: some use this word in a more extensive signification, *viz.* for the shortening a relation, &c. or retrenching every thing not precisely necessary.

SIMPLUDIARIA, in antiquity, a kind of funeral honours paid to the deceased at their obsequies.

SIMUL-CUM, in law, words that formerly were made use of in indictments and declarations of trespass, where there were several defendants, some whereof were known, and others not.

SIN, a breach or transgression of some divine law, or command.

SINAI, a mountain of Arabia Petrea, situated east long. 35°, north lat. 29°, and memorable on account of the laws being given to the Jews on this mount.

SINAI, *knights of*. See CATHARINE.

SINAPI, or **SINAPIS**, *mustard*, in botany, a genus of the tetradynamia filiquosa class of plants, the corolla whereof consists of four cruciform, roundish, plane, patent, and intire petals, with erect linear unguis, and scarcely the length of the cup; the fruit is an oblong, rough pod, consisting of two valves, and containing two cells; the seeds are numerous and globos.

Mustard-seed is an attenuant and resol-

vent in a very high degree; it warms the stomach, and excites an appetite; but its principal medicinal use is external in sinapisms, applications made to certain parts when irritation is intended, but not blistering. It is usually mixed with horse-radish root, and other ingredients of the same kind, for this purpose.

SINAPISM, in pharmacy, an external medicine, in form of a cataplasm, composed chiefly of mustard-seed pulverized, and mixed with the pulp of figs, or with briony, garlic, onion, or the like. See the preceding article.

SINCIPUT, in anatomy, the fore-part of the head, reaching from the forehead to the coronal suture. See the articles HEAD and SKULL.

SINCOPORA, a promontory of Malacca in the East Indies, situated in 2° north lat. opposite to the island of Sumatra, with which this cape forms the straits, called the Straits of Sincopora.

SINDON, in surgery, a little round piece of linen silk, or lint, used in dressing a wound after trepanning. See the article TREPANING.

SINE, or *right SINE of an arch*, in trigonometry, is a right line drawn from one end of that arch, perpendicular to the radius drawn to the other end of the arch; being always equal to half the chord of twice the arch. Thus, SR (plate CCL. fig. 6.) is the right sine of the arches SA and SD.

The radius, CB, is called the whole sine, or the sine of 90°. The sine-complement, or co sine, of an arch AS, is the part CR, intercepted between the center and right sine; so called, as being always equal to SH, the sine of the complement of that arch to 90°, *viz.* SR. And the versed sine of an arch, AS, is the part, RA, intercepted between the right sine, SR, and the extremity of the arch, A. For the use of sines in trigonometrical calculations, see the articles TRIGONOMETRY, NAVIGATION, &c.

SINE ASSENSU CAPITALI, in law, a writ lying where a bishop, dean, prebendary, or master of an hospital, alienates the lands held in right of his bishopric, deanery, &c. without the consent of the chapter, or fraternity; in which case his successor shall have this writ, and sometimes he may enter upon such alienation, and need not bring it.

SINE-CURES, ecclesiastical benefices without cure of souls. No church, where there is but one incumbent, can properly be

be a fine-cure: and though the church being down, or the parish being become destitute of parishioners, the incumbent may be thereby necessarily acquitted from the actual performance of public duty; yet he is still under an obligation to do it whenever a church shall be built, and there are a competent number of inhabitants: and in the mean time, if the church be presentative, as most such churches are, the incumbent is instituted into the cure of souls; such benefices are rather depopulations than fine-cures, and it will be proper for the new incumbent to read the thirty-nine articles, and the liturgy in the church-yard, &c. and to do whatever other incumbents usually do. But a rectory, or portion of it, may properly be a fine-cure, if there be a vicar under the rector, endowed and charged with the cure, in which case it does not come within the statute of pluralities, 21 H. VIII. c. 13. Here therefore, no dispensation is necessary to hold the fine-cure with a former living, nor need the incumbent read the articles, or divine service, as required by 13 Eliz. c. 12. which extends only to a benefice with cure. By the above-mentioned statute of Hen. VIII. not only prebends and rectories, with vicarages endowed, but deaneries, and arch-deaneries are declared to be benefices without cure.

SINE DIE, *without day*, in law, a term frequently used in our proceedings at common law; as when judgment is given against the plaintiff, he is said to be in *miseriordia pro falso clamore suo*; so when judgment passes for the defendant, it is entered *eat inde sine die*, being as much as to say, he is discharged, or dismissed the court.

SINEW, denotes what we properly call a nerve, though in common speech, it is rather used for a tendon. See the articles **NERVES** and **TENDONS**.

SINGING, the action of making divers inflexions of the voice, agreeable to the ear, and correspondent to the notes of a song, or piece of melody. See **MELODY**. The first thing to be done in learning to sing, is to raise a scale of notes by tones and semi-tones to an octave, and descend by the same notes; and then to rise and fall by greater intervals, as a third, fourth, fifth, &c. and to do all this by notes of different pitch. Then these notes are represented by lines and spaces, to which the syllables *fa, so, la, mi*, are

applied, and the pupil taught to name each line and space thereby; whence this practice is called *sol-faing*, the nature, reason, effects, &c. whereof, see under the article **SOLFAING**.

SINGULAR NUMBER, in grammar, that number of nouns and verbs which stands opposed to plural; and is used when we only speak of a single, or one, person, or thing. See **PLURAL** and **NUMBER**.

The Latins, French, English, &c. have no numbers but the singular and plural; but the Greeks and Hebrews have likewise a dual number, peculiar to two persons. See **LATIN**, **FRENCH**, &c.

SINGULTUS, the **HICKUP**, in medicine. See the article **HICKUP**.

SINICAL QUADRANT. See **QUADRANT**.

SINISTER, something on, or towards, the left-hand; sinister is also used, among us, for unlucky, though in the sacred rites of divination, the Romans frequently used it in an opposite sense.

SINISTER, in heraldry. The sinister side of an escutcheon is the left hand side; the sinister chief, the left angle of the chief; the sinister base, the left hand part of the base. See **ESCUTCHEON**, &c.

SINISTER ASPECT, among astrologers, is an appearance of two planets happening according to the succession of the signs, as Saturn in aries, and Mars in the same degree of gemini.

SINISTRI, a sect of antient heretics, thus called, because they held the left hand in abhorrence, and made it a point of religion not to receive any thing therewith.

SINKING FUND, a provision made by parliament, consisting of the surpluse of other funds, intended to be appropriated to the payment of the national debts; on the credit of which very large sums have been borrowed for public uses.

SINNET, on board a ship, a line or string made of rope-yarn, consisting generally of two, six, or nine strings, which are divided into three parts, and are platted over one another, and then beaten smooth and flat with a wooden mallet. Its use is to save the ropes, or to keep them from galling.

SINON OMNES, in law, the name of a writ on association of justices, by which, if all in commission cannot meet at the day assigned, it is allowed that two or more of them may proceed to finish the business.

SINOPE, a port-town of asiatic Turkey, situated on the Euxine Sea: east long. 36° 25', north lat. 42° 25'.

SINOPICA *terra*, in natural history, the name of a red earth of the ochre-kind, called also *rubrica sinopica*, and by some authors *sinopis*. It is a very close, compact, and weighty earth, of a fine glowing purple colour, but in some specimens much deeper than in others, and in some degenerating into paleness; but even in its worst condition, it is a very fine colour. It is of a pure texture, but not very hard, and of an even, but dusty surface. It adheres firmly to the tongue, is perfectly fine and smooth to the touch, does not crumble easily between the fingers, and stains the hands. It melts very slowly in the mouth, and is perfectly pure and fine, and of a very austere astringent taste, and ferments very violently with *aqua fortis*. It was dug in Cappadocia, and carried for sale to the city Sinope, whence it had its name. It is now found in plenty in the New Jerseys in America, and is called by the people there blood stone, from its staining the hands to a blood-colour, and may probably be had in many other places; and this deserves thoroughly enquiring into, since there seems not one among the earths more worthy notice. Its fine texture and body, with its high florid colour, must make it very valuable to painters, and its powerful astringency equally so in medicine. The ancients were well acquainted with it in fluxes and hæmorrhages, and experience shews it possesses the same virtues at this time. The deepest coloured is ever the most astringent.

SINOPE, or **SENOPE**, in heraldry, denotes vert, or the green colour in armories. See the article **VERT**.

Sinople is used to signify love, youth, beauty, rejoicing, and liberty, whence it is, that letters of grace, abolition, legitimation, &c. are always used to be sealed with green wax.

SINUATED LEAF, in botany, a leaf which has a number of sinuses on its side, but those separated by lobes, not very long, nor themselves indented, or notched at the edges. *Sinuato-dentated* leaf, expresses a leaf like the former, but with the lateral lobes of a linear figure.

SINUOSITY, a series of bends and turns in arches, or other irregular figures, sometimes jutting out, and sometimes falling in.

SINUOUS ULCERS. See **ULCER**.

SINUS, in anatomy, denotes a cavity of certain bones, and other parts, the en-

trance whereof is narrow, and the bottom wider and more spacious. Of these sinuses we find several in divers parts of the body, particularly in the internal surfaces of the *os occipitis*; in adults, there is a cross, to which adheres the sinuses and processes of the *dura mater*, the use whereof is to carry the blood from the brain, by a very peculiar mechanism under the *fella equina*, or turcica of the *os sphenoides*; there is also a sinus called the *sphenoidal sinus*; this is sometimes double, and opens into the nostrils; sometimes it is totally wanting. See the articles **SKULL**, **BRAIN**, **SPHENOIDES OS**, **DURA MATER**, &c.

For the sinuses of the larynx and vena portæ, see **LARYNX** and **PORTA**.

Sinus of an artery is used, by some, for any part of an artery where its sides are stretched out beyond the ordinary proportional dimensions elsewhere. Morgagni has observed four such sinuses in the aorta, three of them answering to the semilunar valves; and the fourth is all that part of the aorta between the former sinuses, and the origin of the common trunk of the right subclavian and carotid arteries. **Sinus** of the womb is used for any cavity within its substance. See the article **UTERUS**.

SINUS, in surgery, a little cavity, or facculus, frequently formed by a wound or ulcer, wherein pus is collected. See the article **WOUND**, &c.

A sinus is properly a cavity in the middle of a fleshy part, formed by the stagnation and putrefaction of the blood or humours, and which has wrought itself some vent or exit. See the article **FISTULA**.

SION, a town of Switzerland, in the county of Valais, situated on the river Rhone, twenty-three miles south-east of the lake of Geneva, being a sovereign state.

SION-COLLEGE. See **COLLEGE**.

SIPHON, or **SYPHON**, in hydraulics, a bended pipe, one end of which being put into a vessel of liquor, and the other hanging out of the said vessel over another, the liquor will run out from the first into the last, after the air has been sucked out of the external or lower end of the siphon, and that as long as the liquor in the upper vessel is above the upper orifice of the siphon. Thus, **HDS** (plate **CCL**. fig. 1. n° 1.) is a siphon whose two parts **HD**, **DS**, are called its legs, and by its operation, the water is drawn out of the upper vessel **ABCD**, into

Fig. 1. SITHONS

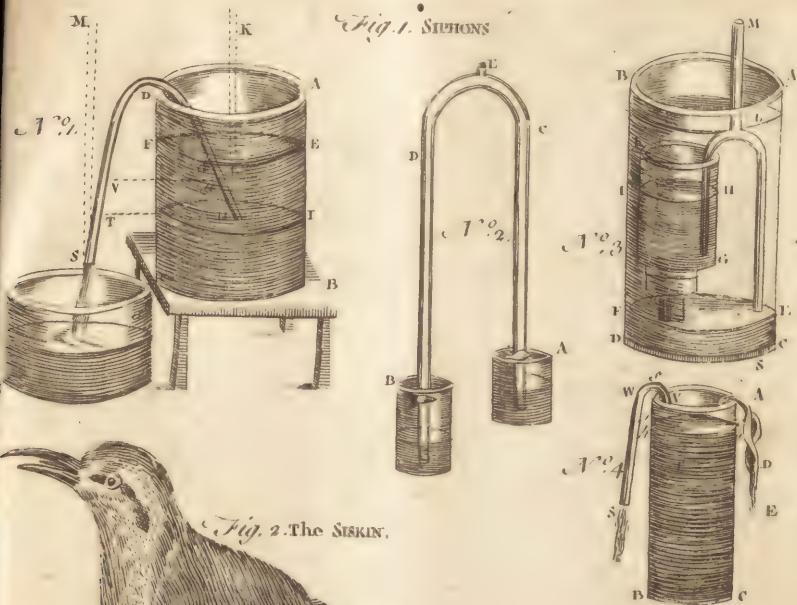


Fig. 2. The SISKIN.



Fig. 3. SITTA.



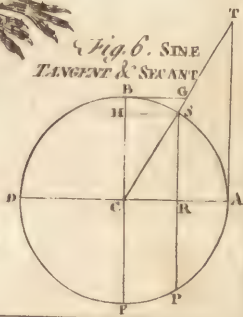
Fig. 4. SIFRUTTS

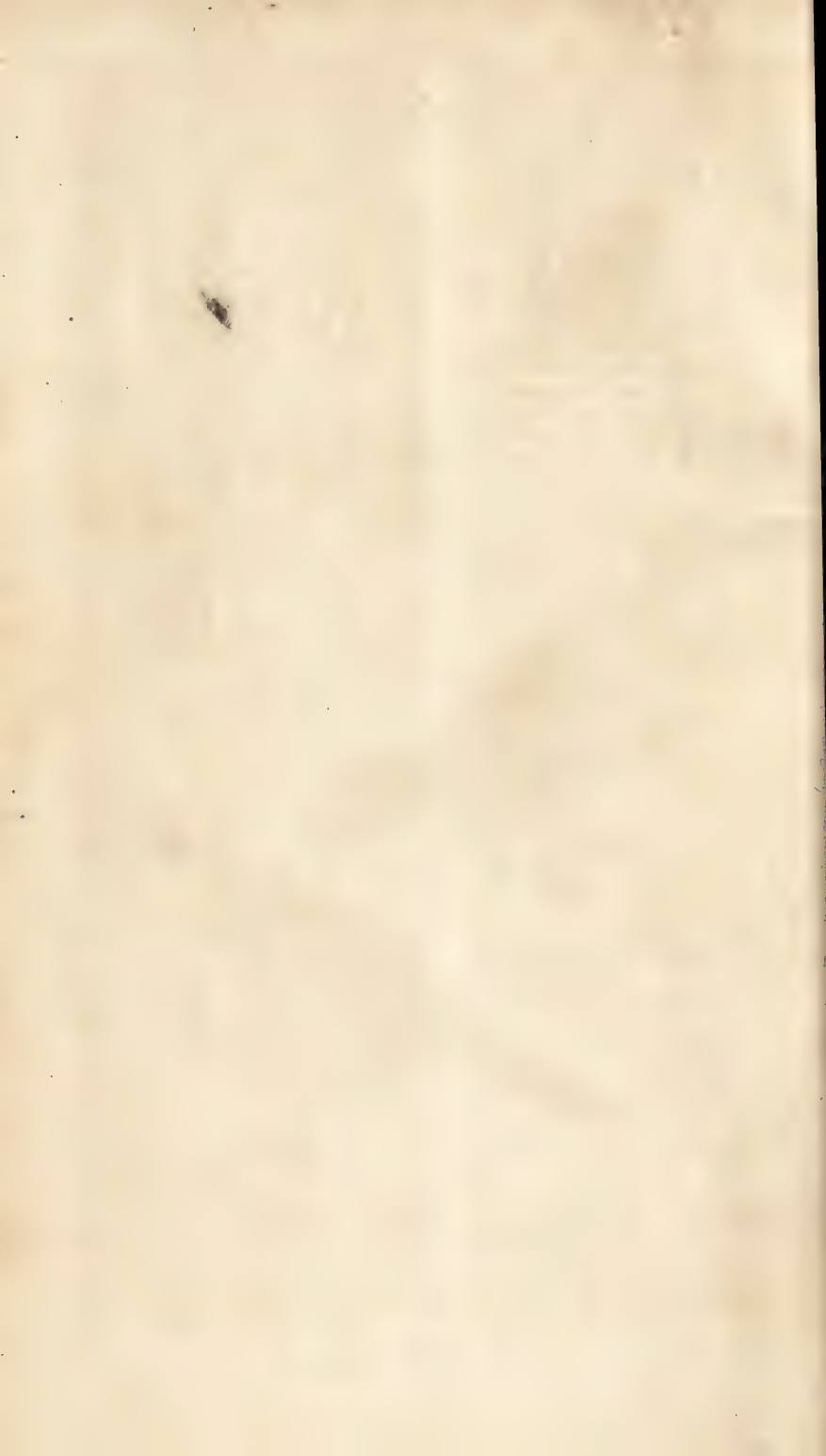


Fig. 5. SISYMINIUM



Fig. 6. SINE TANGENT & SECANT





into the lower *ab*. When you have sucked out the air at *S*, the water follows, coming in at *H*, going in the direction *HGD S*, and out at *S*, as long as the surface *EF* is above *I H*; the level of the mouth of what is called the driving leg of the siphon, being that in which the water goes up, as that through which it goes down is called the issuing leg, and is always longer than the driving leg. Now, the cause of the siphon's running is this. The air which presses into the vessel *ABCD*, represented by the column *K L*, sustains the column of water *L D*, in the short leg of the siphon, pressing against that air with its perpendicular height *D F*, whilst the column of air *M S*, pressing upwards against the hole of the long or issuing leg *D S* (which acts according to the height *DC*) must yield and suffer the water to run out as long as the leg *D S* is longer, or rather higher in perpendicular than *D G*. For since *K* and *M* are supposed at top of the atmosphere, the column *K L* and *M S* are equal in height and pressure, (the height of *L* above *S* being of no account in the height of the atmosphere) as long as *M S* is acted upon by the descending water *D S*, whose height is from *D* to *S* (suppose fifteen inches) an height superior to that of the column *D G* (suppose of seven inches) supported by the column of air *K L*, the column *M S* must yield to the water issuing out at *S*; and however the surface of the water *EF* descends, the column *K L*, by its pressure, will always overcome the resistance of the column *M S*, because it has a less height of water to sustain than *M S* has. If the mouth of the issuing leg had been at *T*, the water would hang in equilibrio, filling both legs of the siphon, when the water is come down in the upper vessel to *I H T*, because then the two columns of air *K L* and *M S* will be acted against by an equal weight of water in the legs of the siphon; but if then you raise the issuing end of the siphon, now supposed at *T*, up to the level of *u V* above *I H*, the water will run back up from *V* to *D*, and so out at *H*, in the upper vessel, because then the column *M S* having only the height *V D* to sustain, will be acted against with less force than the column *K L*, which is pressed against by the whole height *D H*, superior to *V D*. See the articles *FLUID, ENGINE, AIR, &c.* Since the pressure of the air is the cause of the water being pushed up into the

siphon, and the difference of its pressure (as one column is acted against by the water in the short leg more weakly than another column of air is acted upon by the water in the long leg) is the cause of its running continually from one vessel into another, when once set agoing, it follows, that the bend *D* of the upper part of the siphon must not be above thirty-two feet higher than the water in the upper vessel, because the air cannot sustain a column of water, whose height exceeds thirty-two feet. If therefore there was a crane, or siphon *ACEDB* (*ibid.* n° 2.) of about forty feet high, reckoning from *A* to *E*, with cocks *A* and *B* at its lower ends, and an hole at the top *E*, to be stopped with a cork upon occasion, there might be made the following experiment; water being poured into the vessels *A* and *B*, let the cocks *A* and *B* be shut, then with a funnel, pouring in water at *E*, till both legs of the siphon are full, stop the hole *E*, and open the two cocks at once. The water, instead of running from the vessel *A* into *B*, which it would do if the height *CA* was much under thirty-two feet, will in the two legs fall back to *C* and *D* thirty-two feet above *A* and *B*, where it will hang, the air not being able to sustain the water above those heights, and consequently to drive it up over the bend *E*. Nay, unless the water be purged of air before the experiment, the top of the water at *C* and *D* will not be quite thirty feet above the water in the vessels *A* and *B*, because air will extricate itself out of the water, and getting into the cavity *CED*, press a little on the top of the water at *C* and *D*, so that its height will be less to balance the pressure of the atmosphere. See the article *ATMOSPHERE*.

Mercury will run in a siphon in the same manner as water, but then the bend of the siphon must not be more than thirty inches and eight tenths above the stagnant mercury in the upper vessel; because, as it is near fourteen times specifically heavier than water, it will be lifted up by the pressure of the air but the fourteenth part that water is lifted.

To prove further, that a different pressure against the orifices of the unequal legs of a siphon, is the cause of a liquor running through that instrument from a higher into a lower vessel, we may make use of any other fluid, lighter than the fluid to be brought over, instead of air, and leave the bend of the siphon open to the air, as
in

in the following experiment: *ABCD*, (*ibid.* n° 3.) is a pretty large glass jar with a little water (tinged red to make the experiment the more conspicuous) in its bottom, to the height of an inch, as at *E F*. On a stand between *F* and *G* in the great jar, there is placed a little jar, *G H K I*, almost full of the said red water: let down the siphon *S L M G*, open at *S*, *M*, and *G*, into the vessel, so that the end *S* of the long leg stands in the water at the bottom of the great jar; and *G*, the end of the short leg in the little jar, at the bottom of its water; pour in oil of turpentine into the great jar up to *L*, so that the water in the little jar may also be covered with it, and the water will first rise up in both legs of the siphon, so as to meet at the bend *L*, then it will run out of the little jar into the great one through the siphon, in the direction *G H L S*, as long as there is any water in the little jar above *G*. See the article *BAROMETER*.

Instead of hanging a siphon over the side of a vessel, it may be adapted to a cup; so that the short leg being in the cup, the long leg may go down through the bottom of the cup; and then it is called *Tantalus's cup*. See the article *TANTALUS'S CUP*.

There are some siphons through which the water will run out of a vessel without sucking the air from them, or making them in the manner of a waste pipe: but these must be made of capillary tubes whose bore must not be bigger than one tenth of an inch; and as soon as they are put into a vessel of water *T S* (*ibid.* n° 4.) they will begin to run, and so continue as long as there is any water above the driving leg. This happens because the attraction of cohesion, which makes water rise up in small tubes, draws the surface *V* to *W* in the siphon; where being lower than the surface of the water in the vessel, it must run down; because the column of water *WS*, is longer or higher than the column *SV*; and the air pushing down at *V*, must overcome the resistance of the air pushing upwards at *S*. For the same reason, a piece of lift of cloth, *A D*, will make the water come out of the vessel and fall down in drops at *E*; as this piece of cloth is in effect a bundle of capillary siphons made by its interstices. But if the surface of the water in the vessel was at *g b*, the siphon being put in the water, would not run out, but only rise in the siphon up to *e f*,

the height to which a tube of that bore would raise the water by the attraction of cohesion. Whenever the vessel is full this experiment will succeed in vacuum. See *COHESION*, *CAPILLARY*, &c.

SIPHONANTHUS, or *SIPHONANTHEMUM*, a genus of the tetrandria-monogynia class of plants, the corolla whereof consists of a single funnel-shaped petal; the fruit consists of four roundish berries within a patulous cup: the seed is solitary and roundish.

SIRADIA, a city of great Poland, in the palatinate of that name, situated on the river Warta: east longitude 18°, north latitude 52°.

SIRANAGER, a city of hither India capital of the province of Siba, situated on the river Ganges: east longitude 80° north latitude 31° 30'.

SIRE, a title of honour in France, now given to the king only, as a mark of sovereignty. In all placets and petitions epistles, discourses, &c. to the king, he is addressed under the title of sire.

Sire was antiently used in the same sense with seigneur and seigneur, and applied to barons, gentlemen, and citizens.

SIREN, *ossigen*, in antiquity, a kind of fabulous animal, otherwise called a mermaid. See the article *MERMAID*.

The sirens are represented by Ovid, &c. as sea-monsters, with women's faces and fishes tails; and by others decked with plumage of various colours. The three sirens are supposed to be the three daughters of the river Achelous, and are called Parthenope, Ligea, and Leucosia. Homer makes mention of only two sirens, and some others reckon five. Virgil places them on rocks where vessels are in danger of splitting. Some represent them as such charming monsters, who sung so harmoniously, that sailors were wrecked on their rocks without regret, and even expired in raptures.

SIRIK, or *SERQUES*, a town of Lorraine, situated on the Moselle, twelve miles south-east of Luxemburg.

SIRIUS, the *DOG-STAR*, in astronomy, a very bright star of the first magnitude, in the mouth of the constellation canis major. See *CANICULA* and *CANIS*.

SIRMIUM, a city of Sclavonia, situated on the east side of the river Save: east long. 20°, north lat. 45°.

SIRNAME. See the article *SURNAME*.

SISKIN, in ornithology, a species of the fringilla, with a spotted breast, of the bigness of the green-finch: the head is large

large and round: the iris of the eyes is hazel: the beak short, conic and robust: the head black: the back tinged with green: the belly white, and wings elegantly variegated with a transverse streak of yellow. See plate CCL. fig. 2.

ISON, CORN-PARSLEY, or BISHOP'S-WEED, in botany, a genus of the pentandria-digynia class of plants, the general corolla whereof is uniform: the partial corolla is formed of five equal lanceolated inflex petals: there is no pericarpium: the naked fruit is oval, striated, and separable into two parts: the seeds are two, oval, convex, striated on one side, and plane and smooth on the other. The seed of this plant is one of the four lesser hot seeds of the shops, and is an attenuant, aperient and carminative. It is prescribed in flatulencies and colics, and against obstructions of the menses; and is said also to be a lithontriptic.

ISTERON, a city of France, in the province of Provence, situated on the river Durance: east longitude $5^{\circ} 45'$, north latitude $44^{\circ} 16'$.

ISTRUM, or CISTRUM, a kind of ancient musical instrument, used by the priests of Isis and Osiris. It is described by Spon as of an oval form, in manner of a racket, with three sticks traversing it breadth-wise, which playing freely by the agitation of the whole instrument, yielded a kind of sound which to them seemed melodious. Mr. Malcolm takes the sistrum to be no better than a kind of rattle. Oisellus observes, that the sistrum is found represented on several medals and on talismans.

SYMBRIUM, WATER-CRESS, in botany, a genus of the tetradynamia-siliquosa class of plants, the corolla whereof consists of four cruciform, oblong, erecto-patent petals, oftentimes less than the cup, with a great number of unguis: the fruit is a long, crooked, cylindrical pod, consisting of two valves, and containing two cells: the seeds are numerous and small. See plate CCL. fig. 5. The young leaves of this plant are frequently eaten in spring as a salad: the whole plant is of an acid taste, and is a powerful attenuant and resolvent. It is recommended as a kind of specific in the scurvy, and is eaten in large quantities for that intention with great success. It is good against obstructions of the viscera, and consequently in jaundices, and many of the chronic diseases. It is also a pow-

erful diuretic, and promoter of the menses: the best way of using it is in manner of a salad, or by drinking the expressed juice, which is at present much a custom with us in spring with that of brook-lime, &c.

SISYRINCHIUM, in botany, a genus of the gynandria-triandria class of plants, the corolla whereof consists of six oblong erecto-patent plane petals, rounded vertically with a point. The fruit is a triquetrous capsule, rounded vertically, consisting of three cells, and containing three valves: the seeds are numerous and roundish.

SITE, or SCITE, situs, denotes the situation of an house, messuage, &c. and sometimes the ground-plot, or spot of earth it stands on.

In logic, situs is one of the predicaments declaring a subject to be so and so placed: and in geometry and algebra, it denotes the situation of lines, surfaces, &c.

SITOPHYLAX, in grecian antiquity, an athenian magistrate, who had the superintendence of the corn, and was to take care that nobody bought more than was necessary for the provision of his family. By the attic laws, particular persons were prohibited buying more than fifty *oppae*, or measures of wheat a man; and the sitophylax was to look to the observation of this law. It was a capital crime to prævaricate in it. There were fifteen of these officers, ten for the city and five for the pyræus.

SITTA, the NUTHATCH, in ornithology, the name of a distinct genus of birds, usually confounded with the picæ. The beak of the sitta is of a conic and somewhat cultrated form: the tongue is lacerated and emarginated: the feathers of the tail are rigid. The sitta is of the size of our common goldfinch: the head is small and depressed: the beak is short, black on the upper part and white on the lower towards the throat: the head, neck, back, and wings, are grey: the breast of a pale yellow; and the lower part of the belly somewhat reddish. See plate CCL. fig. 3.

SIUM, WATER-PARSNIP, SKIRRET, and NINZIN, in botany, a genus of pentandria-digynia class of plants, the general corolla whereof is uniform: the partial one consists of five inflex equal petals: the fruit is naked, and of an oval or roundish figure, small, striated, and separable into two parts: the seeds are two,

two, roundish, striated, and convex on the one side, and plane on the other. The leaves of this plant, eaten either crude or boiled, are said to break and expel the stone; to excite urine and the menses; to promote the expulsion of the foetus, and to be good in a dysentery.

SIXAIN, SIXTH, *sexagena*, in war, an antient order of battle, wherein six battalions being ranged in one line, the second and fifth were made to advance, to form the van-guard; the first and sixth to retire, to form the rear-guard; the third and fourth remaining on the spot, to form the corps, or body, of the battle.

SIX-CLERKS. See *Six* CLERKS.

SIXTH, *sexta*, in music, one of the simple original concords, or harmonical intervals. See the article CONCORD.

The sixth is of two kinds, greater and less, and therefore is esteemed one of the imperfect concords, though each of them arise from a different division of the octave: the greater sixth is a concord resulting from the mixture of the sounds of two strings, that are to each other as 3 : 5 : the less from those of two strings, in the ratio of 5 : 8. See SCALE.

The less sixth is composed diatonically of six degrees, whence its name, and five intervals, three whereof are tones, and two semi-tones; chromatically of eight semi-tones, five whereof are greater, and three less: it has its form, or origin, from the *ratio super tri-partiens quinta*. The greater sixth is diatonically composed, like the other, of six degrees and five intervals, among which four are tones and one semi-tone; chromatically, of nine semi-tones, five whereof are greater, and four less; consequently, it hath a less semi-tone more than the former. It has its origin from the *ratio super bi-partiens tertia*. See PROPORTION.

Antiently the sixth had only one duplicate, which was the thirteenth; but in the modern system of music it has the twentieth for its triplicate, the twenty-seventh for its quadruplicate, &c. every one of which are indifferently marked in thorough bass by the figure 6. And even the sixth itself both greater and less, when natural, is not expressed any otherwise, than by a simple 6: but when it is greater or less, by accident, the characters of sharp or flat are set along with the 6.

Besides these two kinds of sixths, which are both good concords, there are two

others that are vicious and dissonant; the first, called the defective sixth, composed of two tones and three semi-tones, or of seven semi-tones, five of which are greater, and two less; the second is the redundant sixth, composed of four tones, greater semi-tone and a less; whence some call it pentatonon, as comprehending five tones. These two, being both dissonant, should never be used in melody, and very rarely in harmony.

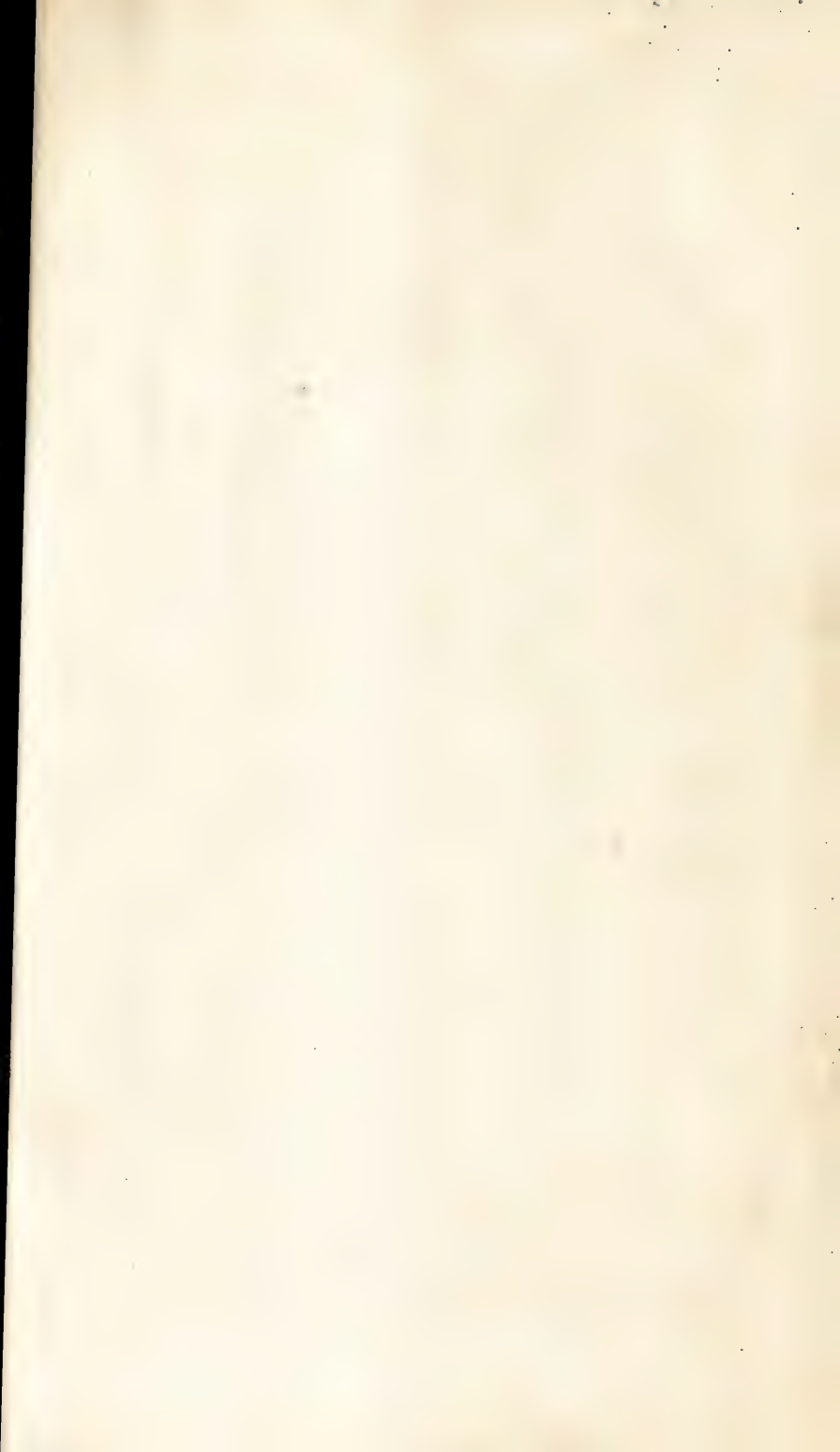
As to the two consonant sixths, the were antiently used very sparingly: at present they are allowed to be used as often as one pleases, as is the case with thirds; the sixths being in reality no other than inverted thirds: but care is usually taken that the first sixth that occurs be a less, the last a greater; and from the greater we rise to the octave; and from the less, fall to the fifth.

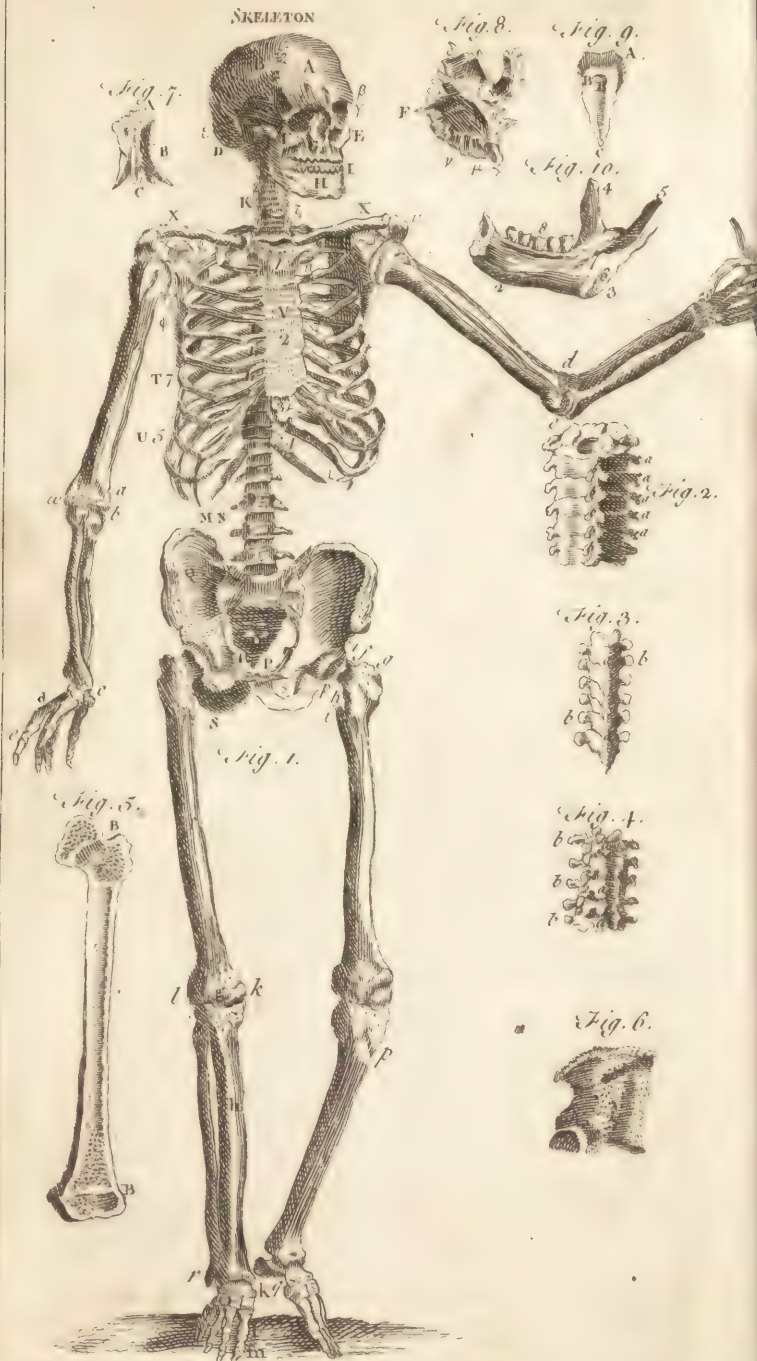
SIZE, the name of an instrument used to find the bigness of fine round pearls withal. It consists of thin pieces of leaves, about two inches long and half an inch broad, fastened together at one end by a rivet. In each of these are round holes drilled of different diameters. Those in the first leaf serve for measuring pearls from half a grain to seven grains; those of the second, for pearls from eight grains, or two carats to five carats, &c. and those of the third, for pearls from six carats and a half to eight carats and a half.

SIZE is also a sort of paint, varnish, or glue, used by painters, &c.

The shreds and parings of leather, parchment, or vellum, being boiled in water and strained, make size. This substance is used in many trades. Mr. Boyle mentions, among other uses, that fine red stands and hanging shelves are coloured with ground vermilion tempered with size, and when dry are laid over with common varnish. There is also a size made of ising-glass, in the same manner, and for the like purposes; but this size will not keep above three or four days, so that no more should be made of it at once than present occasion requires.

The manner of using size is to melt some of it over a gentle fire, and scraping as much whiting into it as may only colour it, let them be well incorporated together; after which you may whiten frames, &c. with it. After it dries, melt the size again, and put more whiting, and whiten





whiten the frames, &c. seven or eight times, letting it dry between each time: but before it is quite dry, between each washing, you must smooth and wet it over with a clean brush-pencil in fair water.

To make gold-size take gum animi and asphaltum, of each one ounce; minium, litharge of gold, and umber, of each half an ounce; reduce all into a very fine powder, and add to them four ounces of linseed-oil, and eight ounces of drying-oil; digest them over a gentle fire that does not flame, so that the mixture may only simmer, but not boil; for fear it should run over and set the house a-fire, keep it constantly stirring with a stick till all the ingredients are dissolved and incorporated, and do not leave off stirring it till it becomes thick and ropy; and being boiled enough, let it stand till it is almost cold, and then strain it through a coarse linen-cloth and keep it for use.

To prepare it for working, put what quantity you may have occasion to use in a horse-muscle shell, adding so much oil of turpentine as will dissolve it, and making it as thin as the bottom of your seed-lac varnish, hold it over a candle, and then strain it through a linen-rag into another shell; add to these so much vermilion as will make it of a darkish-red: if it is too thick for drawing, you may thin it with some oil of turpentine. The chief use of this size is for laying on metals.

The best gold-size for burnishing is made as follows: take fine bole, what quantity you please, grind it finely on a marble, then scrape into it a little beef-suet; grind all well together; after which mix a small proportion of parchment size with a double proportion of water, and it is done.

To make silver size: take tobacco-pipe clay, in fine powder, into which scrape some black-lead and a little Genoa-soap, and grind them all altogether with parchment-size, as already directed.

SYZYGY, or SYZYGY. See SYZYGY.

KAITE, in ichthyology, the variegated raia, with the middle of the back smooth, and one row of spines on the tail. See the article RAIA.

This is one of the largest of the raia, growing to more than a yard in length, and its breadth equal to about three fourths of its length, and its thickness

so considerable that it often weighs a hundred pounds: the back is somewhat gibbous: the belly more flat: the colour is a pale grey, variegated with irregular spots of black: the rostrum is long and sub-acute: the eyes are large and prominent: there are two apertures, one behind each eye: the mouth is large and transverse: the gills are small, and run in two series, five in each, down the breast: the lateral fins of the male fish have a great number of little spines on them, both on the upper and under sides: these are not found in the female.

SKELETON, *σκελετος*, in anatomy, an assemblage or arrangement of all the bones of a dead animal, dried, cleansed, and disposed in their natural situation, and kept in that order by means of wires, &c.

The skeleton of the human body being of great use in learning its osteology, we have given a figure of it in plate CCLI. where fig. 1. is the entire skeleton of a man; A, the frontal bone; B, the parietal bone; C, the temporal bone; D, the occipital bone; E, the bones of the nose; F, the os malarum; G, the superior maxillary bone; H, the lower jaw; I, the teeth; K, the seven vertebræ of the neck, with their cartilages between them; L, L, L, &c. the twelve vertebræ of the back; M, the five vertebræ of the loins; N, the cartilages between the vertebræ of the loins; O, the os sacrum; P, the os coccygis; Q, the os ilium; R, the os pubis; S, the os ischium; T, the seven true ribs; U, the five false ribs; V, the sternum; X, X, the clavicles; Y, the scapula; Z, the humerus, or arm-bone; a, the ulna; b, the radius; c, the carpus; d, the metacarpus; e, the phalanges digitorum; f, the thigh-bone, g, the rotula; h, the tibia; i, the fibula; k, the tarsus; l, the metatarsus; m, the phalanges of the toes; a, the head of the radius; b, the head of the ulna; c, the bones of the carpus; d, the lower appendix, which receives the head of the radius; e, the lower appendix, which receives the head of the ulna; f, the upper head of the os femoris, which is received into the acetabulum or coxendix; g, the outer trochanter; i, the trochanter minor; k, l, the two lower heads of the thigh bone; p, the head of the tibia; q, the os calcis; r, the articulation of the fibula with the tibia.

Fig. 2. *ibid.* is a hind-view of the ver-

tebræ of the neck; *a, a, a, &c.* being the transverse processes, and *b, b, b, &c.* the spine or direct processes.

Fig. 3. is a hind-view of the vertebræ of the back; *a, a, a,* being the spine or direct processes, and *b, b, b,* the transverse processes.

Fig. 4. is a hind-view of the vertebræ of the loins, *a, a, a,* being the spine, and *b, b, b,* the transverse processes.

Fig. 5. is the thigh-bone sawed longitudinally through the middle; *B, B,* being the union of the bone with its epiphysis; and fig. 6. the marrow viewed with a microscope.

Fig. 6. the os ilium sawed through; by comparing which with fig. 5. the different internal structure of round and broad bones is seen.

Fig. 7. A posterior view of the two nasal bones; *A,* their superior sides; *B,* their exterior sides; *C,* their inferior sides.

Fig. 8. A view of the lower part and side next the nose of the left os maxillare, with the palate-bone, and os turbinatum inferius; *γ,* the nasal process; *δ,* the great tuber; *ε,* the palate-plate; *ζ,* the nasal spine; *η,* the orifice of the antrum maxillare; *κ,* the os spongiosum, or turbinatum inferius; *λ,* the two dentes incisores; *μ,* the caninus; *ν,* the five dentes molares.

Fig. 9. A tooth cut perpendicularly, viewed with a microscope; *A,* the fibres of the cortical part; *B,* the bony part; *C,* the entry at the point of the root to *D,* the channel for the nerve and blood-vessels.

Fig. 10. A view of the surface next to the mouth of the right side of the lower jaw; *1,* the substance in the middle of the chin; *2,* the base of the jaw; *3,* the angle; *4,* the corone; *5,* the condyle; *6,* the rough print of the internal pterygoid muscle; *7,* the entry of the channel for the nerve and blood-vessels; *8,* the five grinders.

SKIE, one of the greatest western islands of Scotland, divided from the counties of Ross and Inverness by a narrow channel; being upwards of sixty miles in length and twenty in breadth.

SKIFF, or **SQUIFF**, the least of two slip-boats, serving chiefly to go ashore in, when the ship is in harbour.

SKIN, *cutis*, in anatomy. See the articles **CUTIS** and **CUTICLE**.

SKIN, in commerce, is particularly used for the membrane stripped off the animal

to be prepared by the tanner, skin-currier, parchment-maker, &c. and converted into leather, &c. See **LEATH FURR**, **PARCHMENT**, **HIDE**, &c. Skins and the hair of beasts manufactured become parchment and vellum leather, of which are made shoes, boots, saddles, harnesses, and furniture for horses, gloves and garments, coats and chairs, household stuff, covers, books, drinking vessels, &c. and fit for cloathing, hats, caps, &c. The branches of trade that are derivable from the skin trade, render it a very great mercantile concern, and well deserve preservation as much as we can with ourselves. The British have greatly increased their quantity of furs and skins of all sorts from their northern colonies since they planted northward toward Nova-scotia, but more especially since they have possessed themselves of Canada. The several sorts of skins brought to Europe from those parts are of the following kinds, *viz.* deer-skins, bear, beaver, otter, rackoon, fox, elk, cat, weaselt, martin, mink, musquesh, fisher, &c. Elk-skins, dressed or undressed, pay

on importation, 1s. 5 $\frac{23\frac{1}{2}}{100}$ d. per skin

and draw back, on exportation, 1s.

3 $\frac{52\frac{1}{2}}{100}$ d. and more, if dressed in oil, for

every pound weight, on importation 7d. and draw back, on exportation

4 $\frac{66\frac{3}{4}}{100}$ d. Fox-skins, the dozen, pay

on importation, 3s. 9 $\frac{8\frac{1}{2}}{100}$ d. and draw

back, on exportation, 3s. 5 $\frac{4\frac{1}{2}}{100}$ d. and

for every twenty shillings value, upon

oath, on importation, pay 6s. Goat

skins, in the hair, not otherwise rated

the dozen, pay, on importation, 4s.

9 $\frac{4\frac{5}{8}}{100}$ d. and draw back, on exportation,

4s. 3 $\frac{7\frac{5}{8}}{100}$ d. but those of Ireland

the dozen, on importation, pay only

1s. 7 $\frac{1\frac{1}{2}}{100}$ d. and draw back, on exportation,

1s. 5 $\frac{2\frac{3}{4}}{100}$ d. and when tanned

the dozen, pay, on importation, 13s.

6 $\frac{1\frac{1}{2}}{100}$ d. and draw back, on exportation,

8s. 7 $\frac{5\frac{1}{2}}{100}$ d. Hare-skins, the

dozen, pay, on importation, 9 $\frac{5\frac{1}{2}}{100}$ d.

and draw back, on exportation, 8 $\frac{6\frac{1}{2}}{100}$ d.

Kid-skins, in the hair, the hundred

pay, on importation, 17s. 3 $\frac{4\frac{1}{2}}{100}$ d. and

draw

draw back, on exportation, 4 s. $3\frac{75}{100}$ d. and for every twenty shilling value, upon oath, they pay 4 s. $9\frac{45}{100}$ d. and draw back, on exportation, 4 s. $3\frac{75}{100}$ d. Lamb-skins, dressed in alum, pay the hundred, on importation, 4 s. $9\frac{45}{100}$ d. and draw back, on exportation, 4 s. $3\frac{75}{100}$ d. dressed in oil, every hundred, pay, on importation, 19 s. $1\frac{80}{100}$ d. and draw back, on exportation, 17 s. 3 d. undressed, in the wool, the hundred and twenty, pay, on importation, 2 s. $4\frac{27\frac{1}{2}}{100}$ d. and draw back, on exportation, 2 s. $1\frac{87\frac{1}{2}}{100}$ d. tanned, for every twenty shillings value, upon oath, the lamb skins pay, on importation, 4 s. $9\frac{45}{100}$ d. and draw back, on exportation, 4 s. $3\frac{75}{100}$ d. Lion and panther-skins, undressed, the piece, pay, on importation, 2 s. $4\frac{72\frac{1}{2}}{100}$ d. and draw back, on exportation, 2 s. $1\frac{87\frac{1}{2}}{100}$ d. and the mouse skins, and the pelts of goats, undressed, pay the same duties, both on importation and exportation, as the lion and panther-skins do. Seal-skins, on importation, pay, *per* skin, $4\frac{78\frac{3}{4}}{100}$ d. and draw back, on exportation, *per* skin, $4\frac{31\frac{1}{4}}{100}$ d. Shagreen-skins, each, on importation, pay $4\frac{78\frac{3}{4}}{100}$ d. and draw back, on exportation, $4\frac{31\frac{1}{4}}{100}$ d. Sheep-skins dressed, the dozen, pay, on importation, 1 s. $2\frac{36\frac{1}{4}}{100}$ d. and draw back, on exportation, 1 s. $93\frac{3}{4}}{100}$ d. Slink calf-skins, dressed with the hair on, the pound, pay, on importation, 2 d. and draws back, on exportation, $1\frac{33\frac{1}{2}}{100}$ d. and dressed without the hair, the pound, pay, on importation, 1 d. and draw back, on exportation, $\frac{66\frac{2}{3}}{100}$ d.

SKINK, or **ALSCHARCUR**, in zoology, and the *matéria medica*, a small animal of the lizard kind, brought to us dry from Egypt, and recommended as a great restorative. See the article **LIZARD**. Whatever virtues this medicine may have fresh, as used by the Egyptians, it is ob-

served, that it has none as it comes to us, and serves uselessly to increase the articles of the mithridate. See **MITHRIDATE**.

SKINNER, one who works in skins. Skinners, or fellmongers, shall not retain any journeyman, &c. to work in their trade, except they themselves have served seven years as apprentices thereto, on pain of forfeiting double the value of the wares wrought by such persons. 3 Jac. I. c. 9.

SKIPTON, a town in the west riding of Yorkshire, situated thirty five miles west of York.

SKIRMISH, in war, a disorderly kind of combat, or encounter, in presence of two armies, between small parties, or persons, who advance from the body for that purpose, and introduce to a general and regular fight.

SKULL, *cranium et calvaria*, in anatomy, that part of the head which forms its great bony cavity; and in a living subject contains the brain. See the articles **HEAD** and **BRAIN**.

The shape of the skull is oval; its exterior surface is convex; and its interior, concave: its round figure is an advantage to its capacity: it is a little depressed and longish, advancing out behind and flattened on the two sides that form the temples, which contributes to the enlargement of the sight and hearing: it is of unequal thickness in the several parts, and is composed of two lamellæ, or tables, an exterior and interior, laid or applied over each other, between which there is a diploë, or medullium, being a thin spongy substance, made of bony fibres detached from each lamina, and full of little cells of different bignesses: the tables are hard and solid, the fibres being close to one another: the diploë is soft, in regard the bony fibres are here at a greater distance; a contrivance whereby the skull is not only made lighter, but less liable to fractures: the external lamina is smooth and covered with the pericranium: the internal is likewise smooth, abating the furrows made by the pulsation of the arteries of the dura mater before the cranium be arrived at its consistence: it has several holes, through which it gives passage to the spinal marrow, nerves, arteries, and veins, for the conveyance and re-conveyance of the blood, &c. between the heart and the brain. See the articles **DIPLOË**, **PERICRANIUM**, **DURA-MATER**, &c. The bones of the skull are eight, *viz.* the

the os frontis, the two parietal bones, the two bones of the temples, the occipital, the sphenoides, and the ethmoides; each of which are described under their several names. See the articles *FRONTIS OS*, *PARIETALIA OSSA*, *PETROSA OSSA*, *OCCIPITIS OS*, &c.

All the bones of the cranium are found to be imperfect in new-born infants: the sinus and its medullium are almost wholly wanting; the bony fibres in the formation of almost all of them, are carried in form of rays from a center towards the circumference; and most of them are not single, as in adults, but composed each of several frustules, or little pieces; nor are the sutures at that time formed, and frequently there are triquetrous little bones between them. In adults the several bones of the skull are in general joined by sutures: these sutures are either common or proper; the proper sutures are distinguished into the true and the false or spurious; they are called true sutures when the bones are joined together by means of a multitude of unequal denticulated eminences, forming an appearance somewhat like the edge of a saw: these denticulations enter mutually into each others sinuses, and on the outside are most plainly visible: of this kind are those called the coronal, sagittal and lambdoidal sutures. The false or spurious sutures, are those squamose ones of the temporal and parietal bones, and of the os frontis and sphenoides, in the angle where they unite with the parietal ones. The common sutures are the transversal one which joins the os frontis with the bones below it, the sphenoidal, the ethmoidal, and the zygomatic; but these are of little moment. Some authors mention the having met with skulls in which there were no sutures at all. Between the sutures, particularly the lambdoidal and sagittal, there are found, in many skulls, certain small bones; these are called, by some, *ossa triquetra*, from their figure; by others, *ossa wormiana*: they are uncertain in their figures and situation, and are joined to the others by sutures: these bones are by some esteemed a great medicine in epilepsies.

The use of the sutures is, 1. That the dura mater may in those parts be very firmly joined to the cranium and pericranium. 2. That, in infants, the head may the more easily be extended in its growth from the several bones being at

that period disunited at these places.

3. That the transpiration from the brain may be the more free and easy at the time of life in which they are open, and at which also the habit is more humid.

4. That very large fractures of the skull might in some measure be prevented; and finally, there is another advantage in their openness in children; namely that medicinal applications to the external part of the head may penetrate and do service.

The foramina in the cranium are numerous, and their uses important: these are divided into the external and internal; by the external are meant those which are easily discovered on the external surface of the skull; and by the internal are meant those which are most obvious in the internal surface: of the larger internal foramina we count eleven pair, affording passage to the arteries, veins, and nerves of the brain; besides these, we are to remark one which is single, namely the great foramen of the occipital bones that gives passage to the medulla spinalis and with it to the accessory spinal nerves and to the vertebral arteries. Particular regard is to be had to the first pair of these foramina, (which may indeed be more properly called a congeries of the foramina of the os cribrosum) these give passage to the filaments of the first pair of nerves, called the olfactory nerves: the second pair are in the sphenoidal bones, and give passage to the optic nerves: the third pair are called the unequal and lacerated foramina, and give passage to the third and fourth pair of the nerves, to the first branch of the fifth pair, and to the sixth pair; as also to the emissary of the receptacles of the dura mater: the fourth pair are in the sphenoidal bone, and give passage to the second branch of the fifth pair of nerves, which is distributed to the several parts of the upper jaw: the fifth, or oval foramina, give passage to the third branch of the fifth pair, and to the emissary of the dura mater: the sixth is a very small foramen, and admits of an artery, which is distributed over the dura mater, and is that which forms the impressions of little shrubs or trees on the parietal bones: the seventh is placed between the sella equina and the petrose apophysis, and it transmits no vessels, but is shut up by the dura mater: the eighth pair of foramina give passage to the carotid arteries, whence it is called the carotic foramen; and the interostal nerve

has its egress also at this opening: through the ninth, which is in the os petrosum, passes the auditory nerves; through the tenth, which is between the os petrosum and the occipital bone, pass the par vagum and the lateral sinuses of the dura mater, together with the spinal nerve: the eleventh is in the os occipitis, near the edge of the foramen magnum; and through this pass the ninth pair of nerves, called the linguale. See NERVES, &c. Besides these foramina, there are a number of little ones in the os petrosum, often very visible; one of these carries back a branch of the auditory nerve to the dura mater; and the other principal one transmits the sanguiferous vessels to the labyrinth, or the internal organ of hearing. See the article EAR.

Of the external foramina, there are two proper ones of the os frontis, a little above the orbits; these are, from their situation, called supraorbitalia: they give passage to the ophthalmic nerve of Willis. Besides these, there are four other foramina common to the os frontis, and to the plane or papyraceous bones of the orbit; two of these are placed on each side, and they transmit little nerves and vessels to the sinus of the ethmoidal bone. In the parietal bone there is one, which serves for the passage of a vein from the cutis of the cranium into the sagittal sinus of the dura mater, or from the sagittal sinus to the external veins of the head; but this is often wanting. In each of the ossa temporum there are three common foramina; the first of these is the foramen jugale, which serves for the passage of the crotaphite-muscle; the second is large, in which is the sinus of the jugular vein; and the third is the ductus Eustachii, situated between the petrosum and the sphenoides, and leading from the mouth into the internal ear. Besides these common foramina of the ossa temporum, there are also three proper ones: 1. The meatus auditorius. 2. The aquæduct of Fallopius, situated between the mastoide and styloide process, and transmitting the hard portion of the auditory nerve. 3. A foramen behind the mastoide process, serving for the ingress of a vein into the lateral sinus, or for the egress of one from the lateral sinus into the veins of the occiput. In the occipital bone there are two foramina, situated behind the condyloide apophyses, and serving to give passage to the vertebral veins, into the lateral sinuses of the dura mater; these, however are

wanting in many skulls. In the sphenoides, besides the internal ones already described, are the apertures of the sinuses into the nostrils, common to them with the bones of the palate, and which are the apertures of the nares and fauces; there is another canal in the upper part of the pterygoide processes, serving for the passage of the novum emissarium of the dura mater. In the os ethmoides there are. 1. Those common to this bone with the os frontis, situated in the interior side of the orbit, and already described. And, 2. The apertures of the ethmoidal sinuses into the nostrils. In the examination of different skulls, other foramina, besides these, will occasionally be found in different places; but these are either extraordinary and *lusus naturæ*, as is often the case; or they are otherwise such as serve only to give passage to vessels serving for the nutrition of the bones in which they stand.

For the foramina of the maxillary bones, see the article MAXILLÆ.

For a view of the human skull, see the article SKELETON.

For the method of treating fissures, &c. of the skull, see the articles FISSURE, CONTRA-FISSURE, EXTRAVASATION, FRACTURE, &c.

For the treatment of depressions of the skull, see the articles TREPPANNING and ELEVATORY.

Concealed injuries and wounds of the SKULL.

When a blunt instrument is the occasion of any injury of the cranium, if the injured part does not sufficiently appear of itself, great industry is necessary to discover it. Where the common integuments appear tumid and soft, they are in this case to be divided to the bone; but in making the incision, care must be taken not to lay too much stress upon the knife, lest splinters of the fractured cranium should, by that means, be forced upon the brain. The best way to make this incision, according to Heister, is in form of the letter X, and about an inch and half in length, lifting up the skin at each angle, and leaving the bone bare. The blood that is spilt may be taken up by a sponge, and dry lint stuffed between the skin and the cranium: and having thus found out the injured part of the cranium, the trepan is to be applied, if it be found necessary. If splinters of the bone are now found, they must be removed either with the fingers or forceps, or, when they hang to the cranium, with scissars; but when they

they adhere pretty firmly to the neighbouring parts of the cranium, it is more advisable to replace them, than to endeavour to remove them by violence.

In wounds of the cranium, or skull, the first business is to find whether they are terminated in the external parts of the cranium, or whether they penetrate into its cavity: this is to be known, 1. By the eye. 2. By the probe; which, however, must be gently used here, for fear of bringing on farther mischief. 3. By examining the instrument with which the blow was given, and considering the degree of force with which it was impelled. And, lastly, the presence or absence of very bad symptoms; for a violent blow upon the head will always be attended with vomitings and vertigos, and blood will be discharged from the nose, ears, and mouth, and the wounded person will lose his speech and senses. These disorders will appear, sometimes sooner and sometimes later, but are always most violent, when the wound is by a fall, or by some blunt instrument; in which cases the cranium is usually much shattered. The blood which discharges itself by the wound, that is made by a sharp instrument, will insinuate itself between the common integuments and the cranium: in the contusions that are made with blunt instruments, sometimes it will be concealed under the cranium; and, by corrupting the periosteum and the cranium, will bring on ulcers and caries of the bone, and frequently occasions fevers, convulsions, and death. See CONTUSION, EXTRAVASATION, CARIES, &c.

SKY, the blue expanse of air and atmosphere. See the articles AIR, ÆTHER, and ATMOSPHERE.

The azure colour of the sky Sir Isaac Newton attributes to vapours, beginning to condense there, and which have got consistence enough to reflect the most reflexible rays. M. De la Hire attributes it to our viewing a black object, *viz.* the dark space beyond the regions of the atmosphere, through a white or lucid one, *viz.* the air illuminated by the sun; a mixture of black and white always appearing blue. See the article COLOUR.

SLAB, an outside sappy plank or board sawed off from the sides of a timber-tree: the word is also used for a flat piece of marble.

SLANEY, a city of Bohemia, situated 18 miles north-west of Prague.

SLATE, *stegania*, in the history of fossils a stone of a compact texture and laminated structure, splitting into fine plates. Dr. Hill distinguishes four species of stegania: 1. The whitish steganium, being a soft, friable, slaty stone, of a tolerably fine and close texture, considerably heavy, perfectly dull and destitute of brightness, variegated with a pale brown, or brownish yellow: this species is very common in many counties in England, lying near the surface of the ground; it is generally very full of perpendicular as well as horizontal cavities, many of which are filled up with a substance a little purer and more crystalline than the rest, and is commonly used for covering houses. 2. The red steganium is very fine and elegant slate, of a smooth surface, firm and compact texture, considerably heavy, and of a very beautiful pale purple, glittering all over with small glossy spangles: it is composed of a multitude of very thin plates or flakes, laid closely and evenly over one another, and cohering pretty firmly: this is very common in the northern parts of England and is much valued as a strong and beautiful covering for houses. 3. The common blue steganium is very well known as an useful and valuable stone, of a fine smooth texture and glossy surface, moderately heavy, and of a pale greyish blue; composed of a multitude of even plates, laid close upon one another, and easily splitting at the commissures of them: this is also very common in the north parts of England, and is used in most places for the covering of houses. There are other species of this slate, *viz.* the brownish blue friable steganium, usually called coal-slate; the greyish black friable steganium, commonly called shiver; and the greyish blue sparkling steganium. 4. The friable, aluminous black steganium, being the Irish slate of the shops: this is composed of a multitude of thin flakes, laid very evenly and regularly over one another, and split very readily at the commissures of them. It is common in many parts of Ireland, and is found in some places in England, always lying near the surface, in very thick strata. In medicine it is used in hæmorrhages of all kinds with success, and is taken often as a good medicine in fevers.

There is a sort of slate-stones called, by Dr. Hill, ammoschista: of this kind there

are only two species: 1. That composed only of sparry and crystalline particles; or the grey, friable, dull ammoschistum; being a coarse, harsh, and rough stone, of a very loose texture, considerably heavy; and composed of a large, coarse, obtusely angular gritt, surrounded, and in part held together, by a loose earthy spar. This stone is very common in most countries, and is frequently used to cover houses, instead of tiles: it bears the weather but badly, and is apt to crumble after frosts. 2. That composed of talcy, sparry, and crystalline particles. This comprehends five species, *viz.* the brownish white glittering ammoschistum; the greenish grey shining ammoschistum; the yellowish grey glittering ammoschistum; the hard purple and white laminated ammoschistum; and the bluish glittering slate-stone. These sorts of slate-stone are very common in the northern countries, and are used for covering houses, paving, building, &c.

SLAVE, a person in the absolute power of a master, either by war or conquest. We find no mention of slaves before the deluge; but immediately after, *viz.* in the curse of Canaan: whence it is easily inferred, that servitude increased soon after that time; for in Abraham's time we find it generally established. Some will have it to commence under Nimrod, because it was he who first began to make war, and of consequence to make captives; and to bring such as he took, either in battles or irruptions, into slavery. Among the Romans, when a slave was set at liberty, he changed his name into a surname, and took the nomen or prænomen of his master; to which he added the cognomen he had been called by, when a slave. Great part of the roman power consisted in slaves: they had the wealth of life and death over them, which no other nation had; but this severity was afterwards moderated by the laws of the emperors. The slaves were esteemed the proper goods of their masters, and all they got belonged to them; but if the master was too cruel in his correction, he was obliged to sell his slave at a moderate price. The Romans not only approved of, but even invented, new manners of making slaves: for instance, a man born free among them might sell his freedom and become a slave. There were generally three ways of obtaining slaves; either when they bought them with the booty taken from the enemy, distinct from the

share reserved for the public; or of those who took them prisoners in war; or of merchants who dealt in them, and sold them at fairs.

Slavery is absolutely abolished in Britain and France, as to personal servitude. Slaves make a considerable article of the traffic in America. The english south-sea company have, by treaty, the sole privilege of furnishing the spanish West-Indies with slaves. See **NEGROES**.

For an account of the Lacedemonian slaves, see the article **HELOTS**.

For the custom of marking or stigmatizing slaves, see **STIGMATIZING**.

SLAUGHTER. See **MANSLAUGHTER**, **HOMICIDE**, **MURDER**, **BUTCHER**, &c. Slaughter skins is a term used by our curriers and leather-dressers, for the skins of oxen or other beasts, when fresh and covered with the hair; such as they receive them from the slaughter-houses, where the butchers flea the carcass.

SLEDGE, a kind of carriage without wheels, for the conveyance of very weighty things, as huge stones, &c.

This is also the name of a large smith's hammer, to be used with both hands. Of this there are two sorts; the uphand-sledge, which is used by under-workmen, when the work is not of the larger sort; it is used with the hands before, and they seldom raise it higher than their head; but the other, which is called the about sledge, and which is used for battering or drawing out the largest work, is held by the handle with both hands, and swung round over their heads, at their arm's end, to strike as hard a blow as they can.

SLEEP is defined to be that state wherein the body appearing perfectly at rest, external objects move the organs of sense as usual, without exciting the usual sensations. Sleep, according to Rohault, consists in a scarcity of spirits, which occasions that the orifices or pores of the nerves in the brain, whereby the spirits used to flow into the nerves, being no longer kept open by the frequency of the spirits, shut up of themselves. For, this being supposed, as soon as the spirits, now in the nerves, shall be dissipated, the capillaments of those nerves, having no supplement of new spirits, will become lax, and cohere as if cemented together, and so be unfit to convey an impression to the brain: besides, the muscles being now void of spirits, will be unable to move, or even to sustain the members; thus will sensation

sensation and motion be for the time destroyed. See the article **WATCHING**. Sleep is broken off unnaturally, when any of the organs of sensation is so briskly acted on, that the action is propagated to the brain; for upon this, the new spirits remaining in the brain, are all called together, and unite their forces to unlock the pores of the nerves, &c. But if no object should thus affect the organ, yet sleep would in some time be broken off naturally; for the quantity of spirits generated in sleep, will at length be so great, that stretching out the orifices of the nerves, they will open themselves a passage. See the articles **ANIMAL SPIRITS**, **CIRCULATION**, &c.

With regard to medicine, sleep is defined by Boerhaave, to be that state of the medulla of the brain, wherein the nerves do not receive so copious nor so forcible an influx of spirits upon the brain, as is required to enable the organs of sense and voluntary motion, to perform their functions. Sleep being one of the non-naturals, it is not possible for those to preserve their health, who do not go to sleep in a regular manner; for sleep repairs the spirits, which are dissipated by watching; and consequently it restores the strength of those who are weak, indisposed, or labour much. It likewise promotes perspiration, contributes greatly to digestion, and more to nutrition. The night is the most proper for sleep; for the vigour of the mind and body are better restored in the night than in the day; thus nocturnal labour and lucubrations impair the health. A sound undisturbed sleep is much the best: unquiet interrupted sleep contributes little to restore the strength, and hinders perspiration and digestion. Exercise and custom ought to regulate the duration of sleep: six or seven hours at a time is generally thought to be sufficient; for too much sleep makes a person sluggish, heavy, dulls the faculties, and renders them unfit for business. Immoderate watching is as prejudicial to health, as sleep is beneficial: it may occasion great disorders in the animal oeconomy, by wasting the spirits, and more fluid parts of the blood. The best place for sleep, is a dry spacious room, where the air is good; for close, little, moist places, too much heated, are bad. The best posture, is to lie on the right side at night, and on the left in the morning, with the head raised and the body bent. See **REGIMEN**, &c.

Some of the more extraordinary phæno-

mena of sleep, yet to be accounted for, are, that when the head is hot, and the feet cold, sleep is impracticable; that spirituous liquors first bring on drunkenness, and then sleep; that perspiration in time of sleep is twice as great as at other times; that upon sleeping too long, the head grows heavy, the senses dull, the memory weak, with a coldness, pituitousness, an indisposition of the muscles for motion, and a want of perspiration; that much sleep will sustain life a long time, without either meat or drink; that upon a laudable sleep, there always follows an expansion of all the muscles, frequently a repeated yawning, and the muscles and nerves acquire a new agility; that foetuses always sleep, children often, youth more than grown persons, and they more than old persons; and that people recovering from violent distempers sleep much more than when in perfect health. For the sleepy diseases, see the articles **CARUS**, **COMA-VIGIL**, **COMA-SOMNOLENTUM**, **LETHARGY**, &c.

SLEEPER, or the **GREAT SLEEPER**, in zoology, the hairy-tailed mus with red feet. See the article **MUS**.

This is of the size of the rat, but more corpulent; the head is short and thick; the opening of the mouth small; the nostrils flesh coloured; the eyes large, black, and prominent; and the ears large and naked. This is frequent in many parts of Europe, and retires in winter into caverns under the ground, where it carries however a considerable store of nuts and other fruits.

SLEEPERS, in natural history, a name given to some animals, which are said to sleep all the winter; such as bears, marmotes, dormice, bats, hedge-hogs, swallows, &c. We are told, in *Med. Essays* of Edinb. that these do not feed in winter, have no sensible evacuations, breathe little or none at all, and that most of the viscera cease from their function. Some of these creatures seem to be dead, and others to return to a state like that of the foetus before the birth: in this condition they continue, till by length of time maturing the process, or by new heat, the fluids are attenuated, the solids stimulated, and the functions begin where they left off.

SLEEPERS, in the glass-trade, are the large iron-bars crossing the smaller ones, and hindering the passage of the coals, but leaving room for the ashes.

SLEEPERS, in a ship, timbers lying before and

and aft, in the bottom of the ſhip, as the rung-heads do: the lowermoſt of them is bolted to the rung-heads, and the uppermoſt to the futtocks and rungs.

SLESWICK, the capital of the dutchy of Slefwick, otherwiſe called South Jutland, ſituated on the river Sley: eaſt longit. $9^{\circ} 45'$, and north lat. $54^{\circ} 45'$. See the article **JUTLAND**.

SLIDING, in mechanics, is when the ſame point of a body, moving along a ſurface, deſcribes a line on that ſurface.

For the ſliding rule as variously contrived by Everard, Coggeſhal, Gunter, Hunt, and Partridge, ſee the article **RULE**.

SLIGO, a county of Ireland, in the province of Connaught, bounded by the ocean on the north, by Letrim on the eaſt, by Roſcommon, on the ſouth, and by Mayo on the weſt.

SLING, *funda*, an inſtrument ſerving for caſting ſtones with great violence. The inhabitants of the Balearic iſlands were famous in antiquity, for the dexterous management of the ſling: it is ſaid they bore three kinds of ſlings, ſome longer, others ſhorter, which they uſed according as their enemies were either nearer or more remote. It is added, that the fiſt ſerved them for a head-band, the ſecond for a girdle, and that a third they conſtantly carried with them in the hand.

SLINGING is uſed variously at ſea, but chiefly for the hoifting up caſks, or other heavy things, with ſlings, *i. e.* contrivances of ropes ſpliced into themſelves, at either end, with one eye big enough to receive the caſk, or other thing, to be ſlung.

SLIPPING, among gardeners, the tearing off a ſprig from a branch, or a branch from an arm of the tree. Theſe ſort of ſlips take root more readily than cuttings.

SLOANEA, or **SLOANA**, in botany, a genus of the polyandria-monogynia claſs of plants, having no corolla but the calyx, which is ſometimes taken for one; the fruit is a large, roundiſh, echinated capſule, formed of four valves; the ſeeds are oval, obtuſe, fleſhy, and have long nuclei.

SLOATH, or **SLOTH**, *bradypus*, in zoology. See the article **BRADYPUS**.

The face of the ſloath is covered with hair; the claws are of a ſubulated form; there are no ears, nor are there any middle teeth. This is a very extraordinary animal, both in figure and qualities. It is hard to ſay to what other it is equal in

ſize, ſince it is like none in ſhape; the length of the body is about a foot, and when well fed its thickneſs is equal to its length; the feet are flattened or plain, in the manner of thoſe of the bear or monkey, but are extremely narrow; the claws are very long and ſharp; the head is ſmall and round; and the face ſomething reſembling that of the monkey; the colour of the whole animal is a pale greyiſh brown. It is the ſloweſt mover of all the quadrupeds; the traſverſing the ſpace of fifty yards is the labour of a day for it; it is uſually ſeen on the tops of tall trees, for ſecurity.

SLOATS of a cart, the under-pieces which keep the bottom of the cart together. See the article **CART**.

SLOE, *prunus ſylveſtris*, the english name for the wild plum. See **PRUNUS**.

SLONIM, a city of Poland, in the province of Lithuania, and palatinate of Novogrodeck, ſituated in eaſt long. 25° , and north lat. 53° .

SLOOP, a ſort of floating veſſel, otherwiſe called ſhallop. In our navy, ſloops are tenders on the men of war, and are uſually of about ſixty tons, and carry about thirty men. See the article **SHIP**.

SLOOT, or **SLOTEN**, a town of the United Netherlands in the province of Frieſland, ſituated twenty-one miles ſouth of Lewarden.

SLOT, among ſportsmen. Drawing on the ſlot, ſee the article **DRAWING**.

SLOTH, or **SLOATH**. See **SLOATH**.

SLOUGH, a deep muddy place. The ſkin of a ſnake, the damp of a coal-pit, and the ſcar of a wound, are alſo called by the ſame appellation. The ſlough of a wild boar is the, bed, ſoil, or mire, wherein he wallows, or in which he lies in the day-time.

SLOUTH, or **SLOUGHT**, in hunting, is uſed for a company of ſome ſorts of wild beaſts, as a ſlough of bears.

SLOW-WORM, in zoology, the english name for a ſpecies of anguiſ. See the article **ANGUIS**.

SLUCZK, the capital of the palatinate of the ſame name, in the dutchy of Lithuania and kingdom of Poland, ſituated in eaſt long. 27° , and north lat. 53° .

SLUICE, in hydraulics, a frame of timber, ſtone, earth, &c. ſerving to retain and raiſe the water of the ſea, a river; &c. and on occaſion to let it paſs; ſuch is the ſluice of a mill, which ſtops and collects the water of a rivulet, &c. in order to diſcharge it at length, in greater plenty,

upon the mill-wheel : such also are those used in drains, to discharge water off lands; and such are the sluices of Flanders, &c. which serve to prevent the waters of the sea overflowing the lower lands, except when there is occasion to drown them.

Sometimes there is a canal between two gates or sluices, in artificial navigation, to save the water, and render the passage of boats equally easy and safe, upwards and downwards; as in the sluices of Briare, in France, which are a kind of massive walls, built parallel to each other at the distance of twenty or twenty-four feet, closed with strong gates at each end, between which is a kind of canal or chamber, considerably longer than broad, wherein a vessel being inclosed, the water is let out at the first gate, by which the vessel is raised fifteen or sixteen feet, and passed out of this canal into another much higher. By such means a boat is conveyed out of the Loire into the Seyne, though the ground between them rise above one hundred and fifty feet higher than either of those rivers.

Construction of SLUICES. The construction of sluices ought to be conducted by an able engineer, who is well acquainted with the action of fluids in general; and particularly with the situation of the place, the nature of the soil, &c. where the sluice is to be erected: if on the sea-shore, he ought to be perfectly well acquainted with the effects of the sea on that coast, and the seasons when it is calm or stormy, that he may be able to prevent the fatal accidents thence arising; and, if in a river, it is necessary to know whether it usually overflows its banks, and at what seasons of the year its waters are highest and lowest. The machines for driving the piles should be placed about forty yards from the side of the sluice, above and below it. As to the depth of sluices, it must be regulated by the uses for which they are designed; thus if a sluice is to be erected at the entrance of a basin for shipping, its depth must correspond with the draught of water of the largest ship that may, at any time, have occasion to enter thereby. The rule usually observed, is to make the surface of the bottom of the canal on a level with the low-water-mark: but if the bottom of the harbour and canal be such, as to be capable of becoming deeper by the action of the water, Belidor very justly observes, that the

bottom of the sluice-work should be made deeper than either.

When a sluice is to be placed at the bottom of an harbour, in order to wash away the filth that may gather in it, by means of the waters of a river or canal, in this case the bottom of the sluice-work should be two feet or eighteen inches higher than the bottom of the harbour, that the water may run with the greater violence.

An engineer ought always to have in his view, that the faults committed in the construction of sluices are almost always irreparable. We shall therefore lay down some rules, from Belidor, for avoiding any oversight of this kind: 1. In order to adjust the level of the sluice-work with the utmost exactness, the engineer ought to determine how much deeper it must be than a fixed point: and this he should mark down in his draught, in the most precise terms possible. 2. When the proper depth is settled, the foundation is next to be examined; and here the engineer cannot be too cautious, lest the apparent goodness of the soil deceive him: if the foundation is judged bad, or insufficient to bear the superstructure, it must be secured by driving piles, or a grate-work of carpentry. 3. There should be engines enough provided for draining the water; and these should be entirely under the direction of the engineer, who is to take care that they be so placed as not to be an obstacle to the work; and also cause proper trenches to be cut, to convey the water clear off from the foundation. 4. When the sluice is to be built in a place where the workmen will be unavoidably incommoded by the waters of the sea, &c. all the stones for the mason-work, as well as the timbers for that of carpentry, should be prepared beforehand; so that when a proper season offers for beginning the work, there remains nothing to be done, but to fix every thing in its place. 5. In order to shew the state of the work, an exact journal should be kept of the materials employed, to be signed every week by the chief engineer and undertaker; observing to distinguish the different pieces of materials, and the places where they were employed. 6. When an undertaker is found, who is not only able to be at the expence of providing all the materials, but likewise vigilant and active to execute whatever is judged necessary for the perfection of the work, it would be the worst of policy



Facing page 2983

SHUICE

Fig. 1. The Upper Plan of a Shuice

parts 20 15 10 5 4 3 2 1

Scale

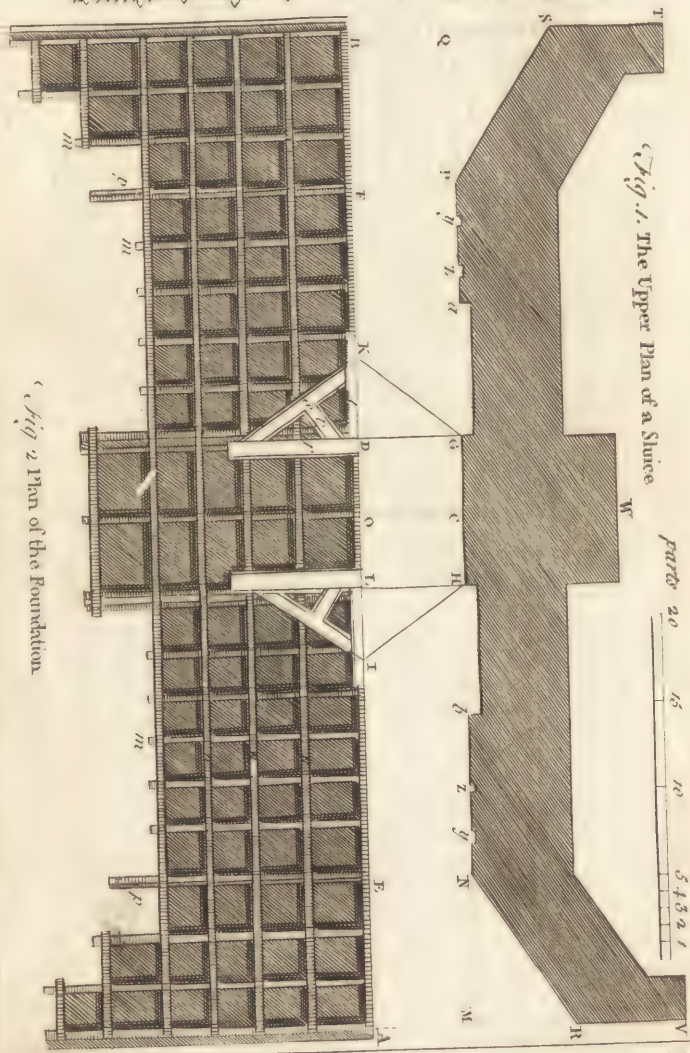


Fig. 2 Plan of the Foundation

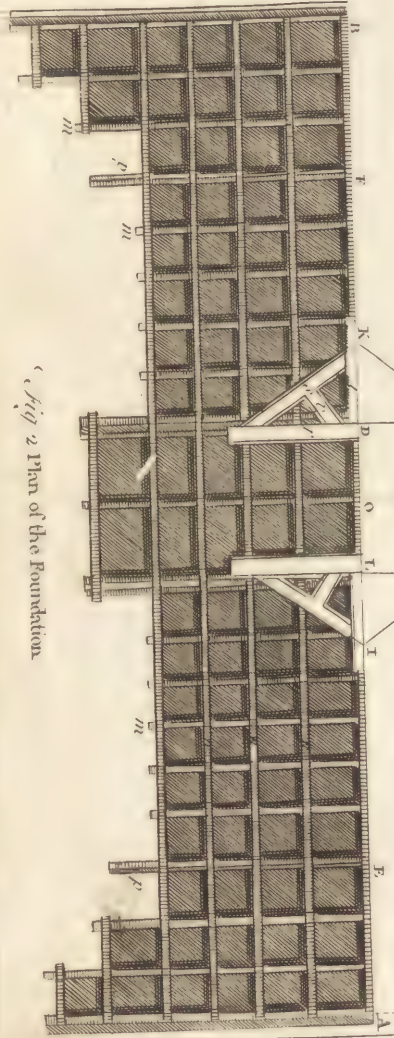
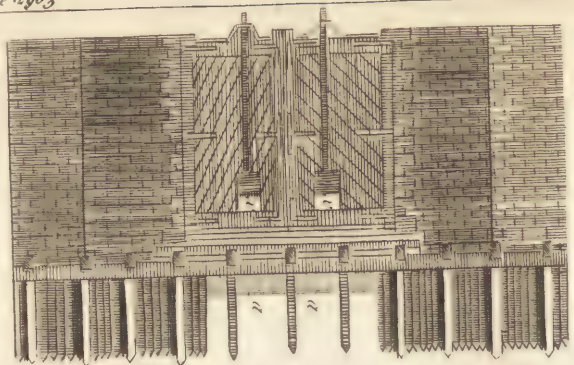


Fig. 3. Section (tools-wise)



licy to give the preference to others, who, through ignorance, or dishonesty, bring in estimates lower than it is possible to execute the work as it ought. However, that the conditions of the contract may be properly executed, the chief engineer, or other persons of unquestionable understanding and honesty, commissioned for that purpose, should take care that able workmen be employed, and that they execute their several parts in a proper manner.

Sluices are made different ways, according to the uses they are intended for: when they serve for navigation, they are shut with two gates, presenting an angle towards the stream; but when made near the sea, there are two pair of gates, one to keep the water out, and the other to keep it in, as occasion requires: the pair of gates next the sea present an angle that way, and the other pair the contrary way; the space inclosed by these gates is called a chamber.

When, sluices are designed to detain the water in some parts of the ditch of a fortress, they are made with shutters to slide up and down in grooves; and when they are made to cause an inundation, they are then shut by means of square timbers let down into cullises; so as to lie close and firm.

Particular care must be taken, in the building of a sluice, to lay the foundation in the securest manner possible; to lay the timber-grates and floors in such a manner, that the water cannot penetrate through any part, otherwise it will undermine the work; and, lastly, to make the grates of a proper strength, in order to support the pressure of the water; and yet to use no more timber than is necessary.

As a general construction is much preferable to a particular one, we shall here give the description of a large sluice, with two pair of gates, from Mr. Muller's Fortification; which may be adapted to any particular case, provided a proper allowance be made for the various circumstances in regard to their use and situation, as already observed.

To construct then the plan of a sluice, suppose half its width, OC, (plate CCLII. fig. 1.) to be divided into six equal parts, or the whole breadth into twelve: these parts serve for a scale whereby the dimensions of the several parts of the work are determined. Through the point O, draw the line AB at right angles to OC,

and take OB = 30 of the above parts; or, which is the same, equal $2\frac{1}{2}$ the width: through the points A and B, draw the lines AR, BS, at right angles to AB; and let the lines passing through the point C, and parallel to AB, meet these last lines in M and Q: then, if MN and PQ be taken each equal to nine parts, and each of the lines MR and QS equal to six, the lines NR and PS will determine the wings of the sluice, and NP the body: and if the lines AR, BS, be produced, so that the parts RV and ST be each six parts, they will determine the faces.

The part of the length, OB, exceeds the other part, OA, by $\frac{1}{4}$ of the width; because we suppose a turning bridge is to be placed on that side, for a communication from one side of the sluice to the other: but when there is no occasion for such a bridge, OB is made equal to OA; and then the whole length will be but four times and a half the width, which is, Mr. Belidor thinks, the best length for a great sluice.

Next to determine the chamber, and the position of the gate, take OD and OL, each equal to four parts; and draw the lines DG and HL parallel to OC: then if the lines GK and HI be drawn, so as to make the angles DGK and LHI each = $35^{\circ} 16'$, it will be the best position that can be given. The cavities x, y, are a foot each way in large sluices, and but nine inches in middling ones: they serve for letting down square timbers to form a batardeau on each side, in case the gates or floor want to be repaired.

The recesses Ga, Hb, in the wall, are made to receive the gates when open; and are of such a depth, that they may be flush with the wall, and not make that part narrower than the rest of the sluice. The thickness of the wall from N to P is equal to $\frac{2}{3}$ of the depth of water; the parts RN and PS are $\frac{3}{4}$, and at V and T $\frac{2}{3}$. The counter-fort W is determined by producing the lines LH and DG, and projects beyond the wall by $\frac{1}{4}$ of the width of the sluice.

As to the timber-grates under the floor and foundation (*ibid.* fig. 2.) if the foundation be bad, we suppose piles to be driven under the crossings of the sleepers m and the tie-beams n; and to prevent the water from getting under the foundation, six rows of dove-tail piles are driven; viz. one at each end, one at each of the

angles N and P, marked *p* (*ibid.* fig. 1. and 2.) and one on each side of the chamber: and it must be observed, that excepting those at the angles N and P, the rest are all driven between two sleepers in order to keep them tight and close together. The sleepers and tie-beams are partly let into each other, and bolted together. And as to the masonry between the gratings, bricks are preferred to small stones; as being much closer, and filling up every part more exactly: they are laid in terras-mortar, as well as the rest of the foundation; and the whole is covered with a floor of three-inch thick oaken planks, laid lengthwise. This done, the frames made to support the gates at the bottom, are laid in their proper places; which are composed of a cell *r*, two hurters *s*, two braces *v*, and a tong *t*. The cell enters about three feet into the side walls, and the sockets to receive the pivots of the gates are placed in it; the tong ought to be so long as to cross three sleepers, to which it is strongly fastened; and the cell, tong, and hurters ought to have the same dimensions; and their height must be such as to be a foot above the last floor of the sluice and chamber; for which reason, the piles under the chamber are left a foot higher than the rest.

Over the first floor is placed another, composed of sleepers and tie-beams, &c. answering exactly to those underneath, and covered with strong oaken planks, laid lengthwise and nailed to the sleepers, as in the first floor. But upon the second floor is laid another of only two-inch thick planks, which do not enter the wall, that they may be repaired when needful: this last floor may be made of yellow deal, and its seams must be well caulked, to prevent the water from making its way through them.

The walls must be made about three feet higher than the greatest depth of the water; and the faces are formed of the largest stretchers and heads that can be had, laid in terras-mortar, and cramped together: but the rest of the work may be done with good common mortar. The top of the wall must be covered with large flat stones or bricks laid in terras-mortar, to prevent the water from penetrating into the masonry: and when all is finished, a bed of clay should be rammed against the wall, two feet thick, all round the outside; beginning as low as

the foundation, and raised as high as the wall.

To prevent the water from carrying off the earth, by its fall at the ends of the sluice, a false floor of fascines is made of as many fathoms long as the water in the sluice is feet high: this false floor is fastened with pickets upon an artificial bed of clay, nearly level with the floor of the sluice; and above the fascines is laid a pavement of hard stones well secured, so that the current may not tear them up. And for the greater security a row of dove-tail piles is driven at each end: and it ought to be observed, that both floors, *viz.* that of the sluices, and that above the fascines, must have a gradual descent about $\frac{1}{48}$ part of the length.

The cross section (*ibid.* fig. 3.) shews the position of a row of piles, and the sleepers above them, into which they are tenoned; also the heads of the tie-beams, the floor between them, the cell and the two floors above it: there is also seen a row of dove-tail piles, broken off in the middle, in order to see part of the masonry *a, a*, between the piles, and under the sleepers. The out-sides of the gates are also seen in this section; also how the planks are joined to the frame, the shutters *x, x*, and the irons both of the gate and shutters.

In the construction of gates, particular care should be taken to join the several pieces together, in such a manner, that the whole frame may be as strong as possible, and yet not to make them more heavy than necessary. The principal parts of the frame of a gate are two stiles or uprights; that which is next to the wall, and to which the pivots are fixed, being called the pivot-post, and the other the chamfered stile, from being edged off so as to make a plain joint with the other gate. The other pieces, which cannot be seen in this section, consist of several rails, placed not nearer to each other than twenty-four inches, nor farther than thirty; and of several braces, which form the same angle with the pivot-post, as the joints of the planks on the outside.

As it would be too tedious to calculate the proper strength of each piece, we shall give their dimensions from Mr. Belidor, which, he says, were taken from those most approved in practice. Supposing then the pieces of the principal frame to be the same, in the same sluice, they

they will be as follows in different sluices. In those from 8 to 12 feet wide, the principal pieces should be 8 inches thick, and 10 broad; the intermediate rails, 6 by 8; the braces and monions, or short uprights to form the wickets, 4 by 6; and the whole covered by two-inch thick planks, as well as all the gates of sluices under 37 feet wide. In sluices from 13 to 18 feet wide, the principal pieces should be 10 by 12 inches; the intermediate rails, 8 by 10; and the braces and monions, 4 by 6. In sluices from 19 to 24 feet wide, the principal pieces should be 12 by 14 inches; the intermediate rails, 10 by 12; and the braces and monions, 5 by 7. In sluices from 25 to 30 feet wide, the principal pieces should be 14 by 16; the intermediate rails, 12 by 13; and the braces and monions 6 by 8. In sluices from 31 to 36 feet wide, the principal pieces should be 15 by 17, the intermediate rails, 13 by 14; and the braces and monions, 7 by 9. In all sluices from 37 to 42 feet wide, the principal pieces should be 16 by 18; the rails, 14 by 16; and the braces and monions, 7 by 9. Lastly, in all sluices from 42 to 48 feet wide, the principal pieces should be 18 by 20; the rails, 15 by 18; and the braces and monions, 8 by 10. However, it ought to be observed, that when the gates are very high, the middle rail is made of the same dimensions with the principal pieces: also in sluices above 36 feet wide, the planks of the gates must be $2\frac{1}{2}$ inches thick; or it may answer still better, to lay two rows of plank of that thickness, in order that the seams of the under row may be covered by the planks of the upper one.

Those who desire to be more particularly informed of the manner of conducting these works, agreeably to their situation, uses, and the nature of the soil where they are built, may consult Belidor's *Architecture Hydraulique*, T. II. P. I. p. 134, seq. also Mr. Muller's Book, already mentioned, p. 287, seq.

SLUTTELBURG, a town of Russia, in the province of Ingria, situated on the south-side of the lake Ladoga, in east long. $31^{\circ} 20'$, north lat. 60° .

SLUYS, a port-town of dutch Flanders, situated opposite to the island of Cadant: east long. $3^{\circ} 15'$, north lat. $51^{\circ} 18'$.

SMACK, a small vessel with but one mast. Sometimes they are employed as tenders

on a man of war, and are used for fishing upon the coast, &c. See **SHIP**.

SMALAND, a province in Sweden, in the territory of Gothland, bounded by East Gothland, on the north; by the Baltic sea, on the east; by Blecking, on the south; and by Halland, on the west.

SMALKALD, a town of Germany, in the landgraviate of Hesse, situated ten miles south of Saxgotha, near which are considerable iron-mines.

SMALLAGE, in botany, a species of apium. See the article **APIUM**.

Smallage has the leaves of the stalks wedge-like, and is called by authors apium palustre, paludapium, and eleo-selinum. It is aperient and discussive, and its root is one of the five great openers. It is very good in gross constitutions, and infarctions of the lungs, especially if eat with oil and mustard. There needs no trouble to reduce it into any medicinal form, since it may be eaten so conveniently and agreeably in salia.

SMALT, a preparation of arsenic, made as follows: the remaining matter of the cobalt from which the flowers have been sublimed being suffered to cool, and then taken out of the furnace, is reduced to fine powder, and calcined over again in the same furnace, and this repeated till there is not the least particle of flame or smoke seen to arise from any part of it. The cobalt thus freed from its arsenical and sulphureous part, is then ground to an impalpable powder, and a mixture is made of one hundred pound of this powder, fifty pounds of pure white pot-ash, and a hundred and fifty pounds of pure white sand; this is all ground together upon a mill, and then put into a proper furnace, like those of our glass-houses, where it runs into an elegant deep blue glass. This is afterwards ground to powder in mills for that purpose, and makes what we call smalt or powder-blue, used by our painters and washerwomen. It has no use in medicine. See the article **COBALT**.

SMARAGDUS, the **EMERALD**, in natural history. See the article **EMERALD**.

SMARIS, in ichthyology, a species of the sparus with a red-spot in the middle of each side, and with the pectoral fins and tail red. See the article **SPARUS**.

SMATCH, a bird more usually called oenanthe. See the article **OENANTHE**.

SMECTIS, a name by which some call fuller's earth. See the article **FULLER**.

SMELL,

SMELL, *odor*, with regard to the organ, is an impression made on the nose, by little particles continually exhaling from odorous bodies: with regard to the object, it is the figure and disposition of odorous effluvia, which, striking on the organ, excite the sense of smelling: and with regard to the soul, it is the perception of the impression of the object on the organ, or the affection in the soul resulting therefrom. See **SENSE**.

The principal organs of smelling are the nostrils, and the olfactory nerves; the minute ramifications of which latter are described throughout the whole concave of the former. See the articles **NOSE** and **NERVES**.

According to Boerhaave, the act of smelling is performed by means of odorous effluvia, floating in the air; being drawn into the nostrils, in inspiration, and struck with such force against the fibrillæ of the olfactory nerves, which the figure of the nose, and the situation of the little bones, render opposite thereto, as to shake them, and give them a vibratory motion; which action, being communicated thence to the common sensory, occasions an idea of a sweet, or fetid, or sour, or an aromatic, or a putrified object, &c. The matter in animals, vegetables, fossils, &c. which chiefly affects the sense of smelling, Boerhaave observes, is that subtile substance inherent in the oily parts thereof, called spirit; for that, when this is taken away from the most fragrant bodies, what remains has scarce any smell at all; but this, poured on the most inodorous bodies, gives them a fragrancy.

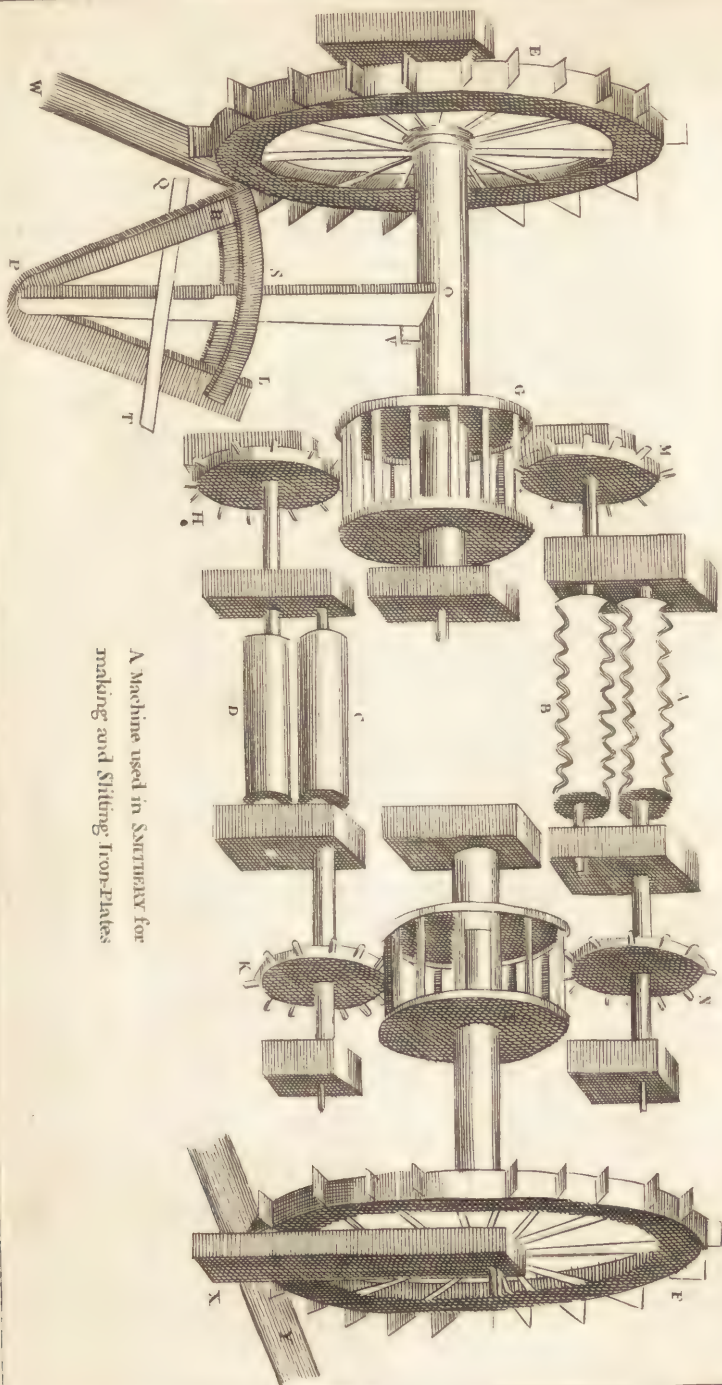
Willis observes, that brutes have, generally, the sense of smelling in much greater perfection than man; as by this alone, they distinguish the virtues and qualities of bodies unknown before; hunt out their food at a great distance, as hounds, and birds of prey; or hid among other matters, as ducks, &c. Man having other means of judging of his food, &c. did not need so much sagacity in his nose; yet have we instances of a great deal, even in man. In the *Histoire des Antilles*, we are assured, there are negroes who, by the smelling alone, can distinguish between the footsteps of a Frenchman and a negro.

The chemists teach, that sulphur is the principle of all smells, and that those are more or less strong, as the sulphur in the odorous body is more or less dried or exalted. Sulphur, they say, is the foun-

dation of odours, as salt is of flavours, and mercury of colours. See the article **SULPHUR**, &c.

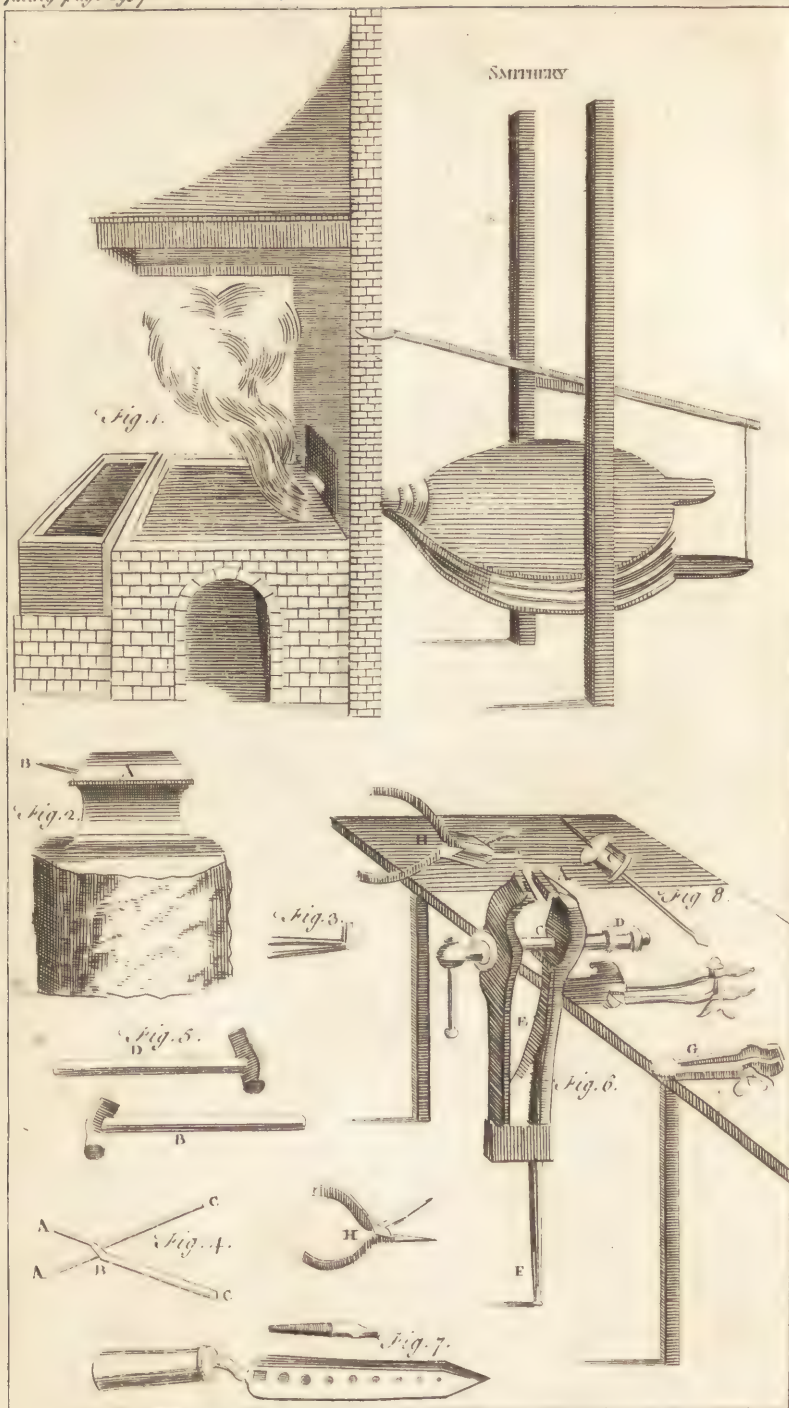
Smell, like taste, consists altogether in the arrangement, composition, and figure of the parts, as appears from the following experiments of Mr. Boyle. 1. From a mixture of two bodies, each whereof is of itself void of smell, a very urinous smell may be drawn, that is, by grinding of quick lime with sal ammoniac. 2. By the admixture of common water, which, of itself, is void of all smell, or inodorous; another inodorous body may be made to emit a very rank smell. Thus camphor, dissolved in oil of vitriol, is inodorous, yet mixed with water, immediately exhales a very strong smell. 3. Compound bodies may emit smells which have no similitude to the smell of the simples they consist of. Thus oil of turpentine, mixed with a double quantity of oil of vitriol, and distilled; after distillation, there is no smell but of sulphur, and what is left behind, the retort being again urged by a more violent fire, yields a smell like oil of wax. 4. Several smells are only to be drawn forth by motion and agitation. Thus glass, stones, &c. which even when heated yield no smell, yet, when rubbed and agitated in a peculiar manner, emit a strong smell; particularly beech-wood, in turning, yields a kind of rosy smell. 5. A body that has a strong smell, by being mixed with an inodorous one, may cease to have any smell at all. Thus if aqua fortis, not well dephlegmated, be poured on salt of tartar, till it ceases to ferment, the liquor when evaporated will yield inodorous crystals, much resembling salt of nitre; yet when burnt, will yield a most noisome smell. 6. From a mixture of two bodies, one whereof smells extremely ill, and the other not well, a very pleasant aromatic odour may be gained, viz. by a mixture of aqua fortis, or spirit of nitre, with an inflammable spirit of wine. 7. Spirits of wine, by mixing with an almost inodorous body, may gain a very pleasant aromatic smell. Thus inflammable spirits of wine, and oil of Dantzic vitriol, mixed in equal portions, then digested, and at last distilled, yield a spirit of a very fragrant smell. 8. A most fragrant body may degenerate into a fetid one, without the admixture of any other body. Thus, if the spirit mentioned in the former experiment be kept in a well closed receiver, it will soon turn to





A Machine used in SMITHERY for
making and Sifting Iron-Plates





to the rankness of garlic. 9. From two bodies, one whereof is inodorous and the other foetid, a very pleasant smell may arise, much resembling musk, &c. by putting pearls into spirit of vitriol; for, when dissolved, they yield a very agreeable smell.

SMELT, in ichthyology, the osmerus with seventeen rays in the pinna ani. This is a beautiful little fish; its length is five or six inches, and its breadth not great in proportion, but the thickness is considerable: the head is of an oblong figure, and somewhat acute; the opening of the mouth is large, the back is convex, and the belly somewhat flat; the lower jaw is a little longer than the upper; the nostrils stand in the middle between the eyes and the extremity of the rostrum; they have each two apertures; the eyes are large and round, the pupil is black, and the iris of a silvery white, but tinged a little with blue towards the upper part.

SMELTING, in metallurgy, the fusion or melting of the ores of metals, in order to separate the metalline part from the earthy, stony, and other parts. See the articles **FUSION**, **ORE**, **FLUX**, **GOLD**, **SILVER**, &c.

SMEW, in ornithology, a name used in some parts of the kingdom for the common mergus. See the article **MERGUS**.

SMILAX, **PRICKLY BINDWEED**; in botany, a genus of the dioecia-hexandria class of plants, without any flower-petals: its fruit is a bilocular berry, with two seeds in each cell.

SMIRIS, in natural history, the same with emery. See the article **EMERY**.

SMITHERY, or **SMITHING**, a manual art, by which an irregular lump of iron is wrought into an intended shape.

The utensils, tools, and operations of this art either have been, or will be, described under their respective articles **FORGE**, **ANVIL**, **HAMMER**, **VICE**, **FILING**, **CASE-HARDENING**, **NEALING**, **SOLDERING**, &c.

In the annexed plate (CCLIII.) fig. 1. represents the smith's forge and bellows; fig. 2. the anvil set in a wooden block, its face being A, and B its beak or beak-iron, corruptly called bickern; fig. 3. and 4. two kinds of tongs, where A, A are the chaps, B the joint, and C, C the handles; fig. 5. represents two kinds of hammer, of which B is the pen, and D the handle; fig. 6. is the vice, of which

A, A are the chaps, C the screw-pin, D the nut, E the spring, and F the foot; G is a hand-vice; and H, H the pliers; fig. 7. is the screw-plate and its tap; and fig. 8. a drill.

These are the most essential tools used in the black-smith's trade; however, as some kinds of work require different tools, we shall here describe a machine for iron-work. AB (plate CCLIV.) is called the slitting mill, CD the plate-mill, and SP the clipping-mill. E and F are two great water-wheels, so disposed that when the water has passed the wheel E in the direction QW, it comes about the wheel F in the direction XY. The water-wheel E, with the lantern G on the same axis, carries the spur-wheels, or cog-wheels, H, M, with the cylinders B and D: and the wheel F, with the lantern I, carries the cog-wheels K, N, with the cylinders A and C. Now the cylinders A and B, as also C and D, turn contrary ways about; the cylinders A and B are cut into teeth for slitting iron-bars, and are about twelve inches in diameter, whereas C and D are only eight inches in diameter. These cylinders may be taken out, and others put in at pleasure; they may also be brought nearer to, or removed farther from, each other, by means of screws which screw up the sockets where their axles turn. The axles of N, I, K, lie all in one horizontal plane; and so do those of M, G, H: but the cylinders A and B, as also C and D, lie one above another.

In order to make iron-plates, if a bar of iron be heated and made thin at the end, and that end put in between the cylinders C and D, whilst the mill is going, the motion of the cylinders will draw it through, on the other side, into a thin plate. Likewise, if a bar of iron be heated and thinned at the end, and put in between the toothed cylinders A and B, it will be drawn through on the other side, and slit into several small pieces, or strings; and then, if there be occasion, any of these strings may be drawn through the plate mill with the same heat, and fashioned into plates.

In the clipping-mill, OPQ (*ibid*) is the sheers for clipping bars of cold iron; V, a cog in the axis of the water-wheel; OP, one side of the sheers made of steel, and moveable about P. The plane LPR is perpendicular to the horizon. When the mill goes, the cog V raises the

the side O P, which as it rises, clips the bar T Q into two, by the edges S P and R P.

The whole of this engine, except the water-wheels, is within the house.

SMOKE, or **SMOAK**, *fumus*, an humid matter, exhaled in the form of vapour, by the action of fire or heat. See **FIRE**, **HEAT**, and **EXHALATION**.

SMOKE-JACK, (plate CCLV. fig. 1.) is a very simple and commodious machine, in a kitchen; so called from its being moved by means of the smoke, or rarified air, moving up the chimney, and striking against the tail of the horizontal wheel, A B; which being inclined to the horizon, is thereby moved about the axis of the wheel, together with the pinion C, which carries the wheel D and E; and E carries the chain F, which turns the spit.

The wheel A B should be placed in the narrow part of the chimney, where the motion of the smoke is swiftest, and the greatest part of it must strike upon the sails. The force of this machine is so much greater, as the fire is greater.

SMOKE-SILVER, and **SMOKE-PENNY**, a payment made to the ministers of several parishes in lieu of tythe-wood.

SMOLENSKO, the capital of a province of the same name, in Muscovy, situated on the confines of Poland, in east long. 33°, and north lat. 56°.

SMUGGLERS, in law, those persons who conceal or run prohibited goods, or goods that have not paid his Majesty's customs. See **DUTY**, **CUSTOMS**, &c.

SMUT, in husbandry, a disease in corn, when the grains, instead of being filled with flour, are full of a stinking black powder.

As to the cause of this distemperature, some have attributed it to excessive rankness, or fatness of the soil; to the manuring the land with rotten vegetables, and to the sowing smutty seed. Mr. Bradley thinks it is owing to the same cause with a blight, *viz.* to multitudes of insects. But Mr. Tull is convinced, from experiment, that it is caused by too much moisture; for planting several plants of corn in troughs of very moist earth, they all produced smutty ears, while very few such were found in the field, from whence these plants were taken.

There are two remedies for the smut, recommended by writers on husbandry;

viz. keeping the seed in salt brine, and changing the seed. See the articles **SEED** and **CHANGE of Seed**.

As to the steeping of seed, when wheat is intended for drilling, it must be soaked in a brine of pure salt, dissolved in water, since urine is found to be highly prejudicial. The most expeditious way of brining wheat for drilling, is to lay it in a heap, and wash it with a strong brine sprinkled on it, stirring it up with a shovel, that it may be all equally brined, or wetted with it; after this, sift on some fine lime all over the surface, and stir it up, still sifting on more in the same manner till the whole is dusted with the lime, it will then be soon dry enough to be drilled without farther trouble. It must be quick-lime, in its full strength, that is used on this occasion.

The bread made of smutty corn, is very pernicious, acting as a narcotic, and occasioning not only sleepiness, but vertiges and even convulsions.

SMYRNA, a city and port-town of asiatic Turkey, situated on a bay of the Archipelago, in the province of Ionia, in lesser Asia, a hundred miles north of Rhodes, and two hundred miles nearly south of Constantinople: east long. 27°, north lat. 37° 30'.

SMYRNIUM, **ALEXANDERS**, in botany, a genus of the pentandria-digynia class of plants, with an umbelliferous compound flower, made up of lesser roseaceous ones, with five lanceolated petals; the fruit is naked, sub-globose, striated, and separable into two parts; and the seeds are two, lunulated, convex on one side, with three striz, and plane on the other.

The leaves, roots, and seeds of this plant are used in medicine; its virtues being the same with those of smallage, only in a somewhat stronger degree.

SNAFFLE, in the manege, is a very slender bit-mouth, without any branches, much used in England; the true bridles being reserved for the service of war.

The snaffle, or small watering-bit, is commonly a scatch-mouth, with two very little, straight branches, and a curb, mounted with a headstall, and two long reins.

SNAIL, *limax*, in zoology, a genus of the gymnarthria, or naked insects, the body of which is of a figure approaching to cylindric, and is perforated at the side; the

Fig. 1. A SMOKE-JACK

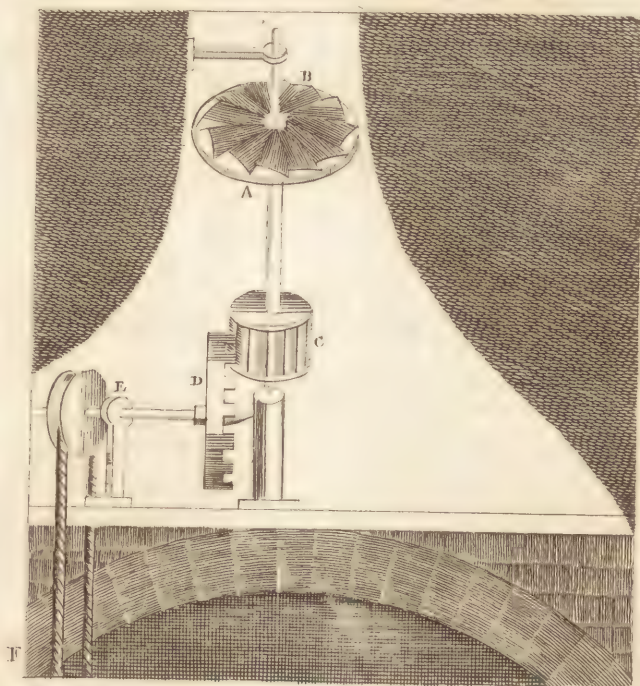


Fig. 2. SNAILS

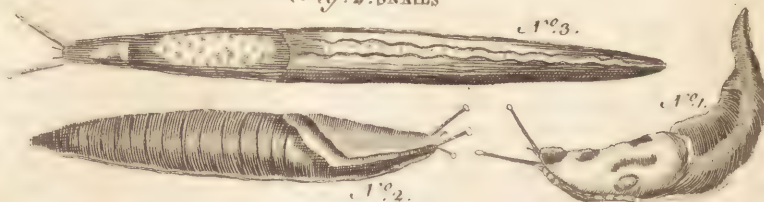


Fig. 3. The SOLEN, or RAZOR-SHELL





the tentacula, or horns, as they are called, are four in number, and two of them have the appearance of eyes.

There are a great many species of snails, whereof we shall only mention a few.

1. The black naked snail, a considerably large insect, being commonly three inches long, and half an inch broad; its whole body is furrowed and much wrinkled, and is of a deep black, except the belly, which is grey. See plate CCLV. fig. 2. n° 1.

2. The naked reddish snail grows only to about two inches in length, and is also covered with numerous slight furrows. *ibid.* n° 2.

3. The amber-coloured snail, (*ibid.* n° 3.) when full grown, is only about an inch and a half long: its colour is a glossy yellow, with a cast of brown in it, and the whole body is variegated with spots of a greyish colour.

Snails are all hermaphrodites, and are esteemed provocatives by the Asiatics.

SNAKE, *anguis*, in zoology. See the article **ANGUIS**.

The common snake is a harmless and inoffensive animal, and might even be kept tame in houses to destroy vermin. Its flesh is restorative, like that of the viper. See the article **VIPER**.

For the blood-snake, rattle-snake, &c. see the articles **HÆMORRHUS**, **RATTLE-SNAKE**, &c.

SNAKE-ROOT, *serpentaria*, in botany, a species of polygala. See **POLYGALA**.

SNAKE-STONE, a name given to the ammonitæ. See **AMMONITÆ**.

SNAKE-WEED, in botany, the same with bistort. See the article **BISTORT**.

SNAPDRAGON, *antirrhinum*, in botany, a genus of the didynamia-angiospermia class of plants, with a monopetalous perforated flower, divided into two lips; the upper one of which is bifid, and the lower one trifid: the fruit is a roundish bilocular capsule, containing a great many kidney-shaped seeds.

This genus comprehends also the linaria, or toad-flax, the asarina, elatine, and cymbalaria of authors.

SNATCH-BLOCK, among sea-men, a kind of pulley. See **PULLEY**.

SNEEK, a town of Friesland, in the United Provinces, twelve miles south of Leewarden.

SNEEZING, *sternutatio*, a convulsive motion of the muscles of the breast, whereby the air is expelled from the nose, with much vehemence and noise.

Sneezing is caused by the irritation of the upper membrane of the nose, occasioned by acrid substances floating in the air, or by medicines called sternutatories. See **SNUFF** and **STERNUTATIVE**.

SNETHAM, a market-town of Norfolk, twenty-eight miles north-west of Norwich.

SNIATIN, a town of Red Russia, in Poland, on the confines of Moldavia: east long. 25° 20', north lat. 48°.

SNIGGLING, a method of catching eels, when they hide themselves in holes: it is performed by thrusting a baited hook and strong line into the holes where they are supposed to lie concealed; and if there be any, they will certainly bite; so that if the tackling hold, the largest eels may be thus taken.

SNIBE, in ornithology, a species of numenius, with four brown streaks on the head; it is a small but beautiful bird, and its flesh is delicate, and much esteemed at table.

SNOUT, or **CALF'S-SNOUT**, in botany, the same with snapdragon. See the article **SNAPDRAGON**.

SNOW, *nix*, in meteorology, a meteor produced in this manner: when the vapours are become considerably condensed, yet not so far as to be liquified, or dissolved into water; then by a special degree of coldness in the upper region of the air, the particles of the condensed vapour are changed into ice; several of which adhering together, form little fleeces of a white substance, somewhat heavier than the air; and therefore descend in a slow and gentle manner thro' it; being subject, by reason of its lightness, to be driven about by the various motions of the air, and wind; and is what, when arrived to the surface of the earth, we call snow. See **FROST**, **HAIL**, &c. The use of snow must be very great, if all be true Bartholin has said in its behalf, in an express treatise, *De nivis usu medico*; he there shews, that it fructifies the earth (which, indeed, is a very old and general opinion) preserves from the plague, cures fevers, cholics, tooth-achs, sore eyes, and pleurifies (for which last use, his countrymen of Denmark use to keep snow-water gathered in March.) He adds, that it contributes to the prolongation of life; giving instances of people in the Alpine mountains that live to great ages; and to the preserving dead bodies, instances whereof he gives in persons buried under the snow in passing the

the Alps, which are found uncorrupted in the summer, when the snow is melted. He observes, that, in Norway, snow-water is not only their sole drink in the winter, but snow even serves for food; people having been known to live several days, without any other sustenance.

Indeed the generality of these medicinal effects of snow are not to be ascribed to any specific virtue in snow, but to other causes. It fructifies the ground, for instance, by guarding the corn or other vegetables, from the intenser cold of the air, especially the cold piercing winds. And it preserves dead bodies, by constipating and binding up the parts, and thus preventing all such fermentations or internal conflicts of their particles, as would produce putrefaction.

Snow may be preserved by ramming it down in a dry place, under-ground, and covering it with chaff, in the manner of ice. See the article ICE.

SNOWDON HILL, the highest mountain in Wales, situated in Carnarvonshire.

SNOW-DROP, in botany, the English name of the *galanthus*. See **GALANTHUS**.

SNOWDROP-TREE, the same with the *chionanthus*. See **CHIONANTHUS**.

SNUFF, a powder chiefly made of tobacco, the use of which is too well known to need any description here. See the article **TOBACCO**.

However though tobacco be the basis of snuff, yet a multiplicity of other matters are often added, to give it an agreeable scent.

The kinds of snuff being endless, we shall only observe, that there are three grand sorts, *viz.* that which is only granulated, and called *rappee*; that which is reduced to a very fine powder, and called *scotch*, *spanish*, &c. snuff; and the third, a coarser kind, remaining after sifting the second sort.

SOAL-FISH, *solea*, in ichthyology, the english name of the long-bodied pleuronectes, with rough scales on both sides. See **PLEURONECTES**.

This is a fish deservedly held in great esteem at table: its usual length is from five, or six, to fourteen inches in length; it is of an oblong elliptical figure, and thin in proportion to its other dimensions: its eyes are not protuberant, but are placed at a greater distance than in most other species, and both on the left side.

SOAP, or **SOPE**, in commerce, and the

manufactures, a kind of paste, sometimes hard and dry, and sometimes soft and liquid, much used in washing, whitening linens, and by dyers, fullers, &c.

The principal soaps of our manufacture, are the soft, the hard, and the bale soap; all which consist of an intimate union of the salt of pot-ash, with oil, or animal-fat.

1. The soft soap is either green or white. The principal ingredients in the green-kind are lyes drawn from pot-ashes, and lime boiled up with tallow and oil. First, the lye and tallow are put into the copper together, and when melted, the oil is put to them, and the copper made to boil; then they damp or stop up the fire, while the ingredients remain in the copper to knit or incorporate; which being done, they set the copper a boiling again, feeding or filling it with lyes as it boils, 'till they have put in a sufficient quantity; after which they boil it off with all convenient speed, and put it into barrels.

One sort of white soap is made after the same manner with green soap; excepting that they do not use any oil in this. Another sort of white soft soap is made from lyes of ashes of lime, boiled up twice with tallow. First they put a quantity of lyes and tallow into the copper together, which is kept boiling, being fed with lyes as it boils, till it is boiled enough, or that they find it grains; then they separate or discharge the lyes from the tallowish part, which they put into a tub, throwing away the lye; this they call the first half-boil. Then they charge the copper again with fresh tallow and lye, and put the first half-boil out of the tub into the copper a second time, and keep it boiling with fresh lye and tallow, till it is brought to perfection, and afterwards filled out into soap casks.

2. Hard soap is made of ashes and tallow, and commonly boiled at twice; the first boiling they also call a half-boiling, which is performed exactly after the same manner as the first half-boil of the soft white soap. Then they charge the copper again with fresh lye, and put into it the first half-boil again, feeding it with lye, as it boils, till it is boiled enough, or till it grains; then they discharge the lye from it, and put the soap into a frame to boil and harden.

3. Ball-soap is made also of lye from ashes and tallow; they put the lye into the

the copper, and boil it till the watery part is quite gone, and there is nothing left in the copper but a sort of nitrous matter (which is the very strength and essence of the lye) then they put tallow to it, and keep the copper boiling and stirring for half an hour or more, in which time the soap is completed, which they put into tubs or baskets with sheets in them, and immediately (while soft) make it into balls.

It takes up near twenty-four hours to boil away the watery part of the lye.

The process of soap-boiling, as at present practised, being a very tedious, as well as expensive, operation, Dr. Shaw proposes a method to shorten it, by substituting motion in the place of fire: this motion might be easily given, by an engine, to any quantities of the ingredients at a time; and that such a method is effectual for making soap, the doctor proved by the following experiment: he mixed, in a large phial, half a pint of soap-lye, with an ounce, or more, of oil-olive; and shaking these together, for a quarter of an hour, a true cake of soap was obtained on the top of the liquor, which hardened on being exposed to the air.

SOAP, *sapo*, in medicine. The purer hard soap is the only sort intended for internal use; this, triturated with oily or resinous matters, renders them soluble in water; and hence becomes an ingredient in pills composed of resins, promoting their dissolution in the stomach, and union with the animal fluids. Boerhaave always prescribed soap in resinous pills, unless where an alkalescent or putrid state of the juices forbade its use. From the same quality, soap seems well fitted for dissolving oily or unctuous matters and viscidities in the human body; thereby opening obstructions, and deterging all the vessels it passes through. It is likewise a powerful menstruum for the calculus, or stone in the bladder; a solution of it in lime-water being one of the strongest dissolvents that can with safety be taken into the stomach: the virtue of this composition is considerably greater than the aggregate of the dissolving powers of the soap and lime-water, when unmixed. See the articles **LIME**, and **LITHONTRIPTICS**.

The soft soaps are more penetrating and acrimonious than the hard, and are therefore only used externally.

The proper menstruum of soap is a proof spirit, freed from its acid; this dissolves it the most perfectly, and in the greatest quantity, three ounces taking up one or more; and in this form, soap may, in some cases, be conveniently exhibited.

To purify soap for medicinal use, slice it into a clean pewter vessel, and pour upon it two gallons of rectified spirit of wine: place the vessel in a bath-heat, and increase the fire so as to make the spirit boil, and it will soon dissolve the soap. Let the vessel stand close covered in a warm place, till the liquor has grown perfectly clear; and, if any oily matter swim upon the surface, skim it off; then decant the limpid liquor, and distill off from it all the spirit that will arise in the heat of a water-bath. Expose the remainder to a dry air, for a few days, and it will become a white, opaque, and somewhat friable mass, not in any degree acrimonious, and consequently well fitted for medicinal purposes.

There are also several other saponaceous medicines, as soap of almonds, of tartar, &c. See **ALMOND**, &c.

SOAP-EARTH, or **SOAP-ROCK**, in natural history. See **STEATITES**.

SOAR-HAWK, an appellation given to an hawk, from the time of taking her from the eyrie, till she has mewed, or cast her feathers.

SOC, or **SOK**, *soca*, in law-books, denotes jurisdiction. See **JURISDICTION**.

SOCAGE, an ancient tenure, by which lands were held on condition of ploughing the lord's lands, and doing the operations of husbandry, at their own charges. See **TENURE**.

SOCO, in ornithology, the ferrugineous ardea variegated with black. See the article **ARDEA**.

This is nearly of the size of our common heron, but the body is smaller in proportion to the length of the neck and legs; the head is large, and of an oblong figure, narrowest at the front, and broader behind; the beak is five inches long, and of a greenish olive-colour; the eyes are large, their iris yellow, the head is a deep brown, has no crest, and very little of the black variegation.

SOCOCCUS, in antiquity, a kind of high-shoe, reaching above the ankle, worn by comedians, as the cothurnus was by tragedians.

SOCIETY, *societas*, in general, denotes a number of persons united together for

their mutual assistance, security, interest, or entertainment.

The social principle in man is of such an expansive nature, that it cannot be confined within the circuit of a family, of friends, or a neighbourhood: it spreads into wider systems, and draws men into larger communities and common-wealths; since it is in these only, that the more sublime powers of our nature attain the highest improvement and perfection of which they are capable.

In society, the mutual aids, which men give and receive, shorten the labours of each; and the combined strength and reason of individuals give security and protection to the whole body. There is a variety of genius among mankind; some being formed to lead and direct others, to contrive plans of employment for individuals, and of government for communities, to invent laws and arts, and superintend their execution, and in short to refine and civilize human life: others again, who have not such good heads, may have honest hearts, a true public spirit, love of liberty, order, &c. and finally, others seem best disposed for manual exercises, as bodily labour. Society finds proper employment for every genius, and the noblest objects and exercises for the noblest geniuses. In society, a man not only finds more leisure, but better opportunities of applying his talents with success.

From this short detail it appears, that man was formed for society; which rests on these two principal pillars. 1. That it afford security against those evils, which are unavoidable in solitude. 2. That it enables us to obtain those goods, some of which cannot be obtained at all, and others not so well, in a state of solitude, wherein men depend wholly on their own sagacity and industry. See GOVERNMENT and LAW.

Royal SOCIETY, an academy, or college, established by charter, by king Charles II. for promoting natural knowledge, and useful arts, by experiments. See the article ACADEMY.

It consists of several hundred fellows, or members, mostly british; some persons of the highest rank, and many eminent gentlemen and learned men of other nations. Their meetings are held once a week, at their house in Crane-Court, Fleet-Street, London; where they discourse upon the productions and rarities

of nature and art, and consider how the same may be improved for the good of mankind: here are also read letters, and other philosophical papers, sent by ingenious persons, both at home and abroad; upon which they discourse in the plainest manner, without affecting studied speeches. See *Philosophical TRANSACTIONS*. This society, of which his britanmic majesty is perpetual patron, is governed by a council of twenty-one members, ten of whom are yearly chosen out of the society, on St. Andrew's-day: the chief of the council bears the title of president, whose proper office is to call and dissolve the meetings, to propose the matter to be debated, call for experiments, and admit such members as shall be elected, which must be by a majority of at least twenty-one votes: whereupon he is admitted, after paying 40s. and subscribing, That he will endeavour to promote the good of the Royal Society of London, by the improvement of natural knowledge; and being thus admitted, he afterwards pays 13s. a quarter, as long as he continues a member of the society.

SOCIETY for the encouragement of arts, manufactures, and commerce. The public spirit of this age is no where more remarkably shewn, than in the flourishing condition of this valuable society, whose object is the improvement of the polite, useful, and commercial arts, in all their various branches, by exciting industry and emulation among all who can be stimulated by honourary or pecuniary rewards. It was set on foot in the year 1753, by the lord Folkestone, lord Romney, Dr. Hales, and seven or eight private gentlemen, who were brought together by the unwearying pains of Mr. William Shipley, who had long laboured to reduce into practice a scheme he had formed for this purpose. This society at their second meeting determined to make a beginning, by proposing rewards for the discovery of cobalt, for the encouragement of boys and girls in the art of drawing, and for the planting of madder in this kingdom. And now money being wanted, a voluntary subscription was begun, soon after which a plan was drawn up for forming, regulating, and governing the society; and now the utility of such a society became so well understood, that immediately several noblemen and gentlemen offered them-

themselves as members, and ever since that time, its increase has been so extraordinary, that it consists of several thousand members, among whom are most of the nobility, and persons of large fortunes in the kingdom. The officers of this society are a president, eight vice-presidents, a register, a secretary and an assistant secretary, who are all chosen by ballot annually, on the first Tuesday in March. Every person, desiring to be a member of this society, must be proposed by three members; his name, addition, and place of abode being read aloud by the secretary, he is ballotted for at the next meeting: he shall be deemed a perpetual member upon payment of twenty guineas, or a subscribing member upon payment of any sum not less than two guineas annually. Ladies are also admitted members, and foreigners are likewise admitted as honourary or corresponding members. The money of the society is placed in the bank of England, in the name of the president and vice-presidents, three of whom are empowered to draw any sum the society shall order to be paid. The society's office is opposite to Beauford Buildings in the Strand, in London, where their meetings are held every Wednesday evening, from the second Wednesday in November, to the last Wednesday in May, and at other times, every first and third Wednesday of every month.

SOCIETY for the reformation of manners, and putting in execution the laws against immorality and profaneness. It was set on foot, about forty years ago, by five or six private persons in London, but is since exceedingly increased by numbers of all denominations. A particular body of the most considerable hereof bear the expence of prosecutions, &c. without any contribution from the rest. These chiefly apply themselves to the prosecuting people for swearing, drunkenness, and prophaning the sabbath. Another body, of about fifty persons, apply themselves to the suppressing lewdness, and by them above five hundred lewd houses have been actually suppressed; a third body consists of constables; and a fourth of informers. Besides these, are eight other regular mixed bodies of house-keepers and officers, who inspect the behaviour of the constables and other officers, assist in searching disorderly houses, seizing offenders, giving information, &c. There are several other societies of this kind at

Bristol, Canterbury, Nottingham, &c.

SOCIETY for propagating the gospel in foreign parts, was instituted by king William, in 1701, for securing a maintenance for an orthodox clergy, and making other provisions for the propagation of the gospel in the plantations, colonies, frontiers, &c. To that end he incorporated the archbishops, several bishops, and other nobility, gentry, and clergy, to the number of ninety, with privilege to purchase two thousand pounds, per year, inheritance and estates for lives, or years, with other goods, to any value. They meet yearly on the third Friday in February, to chuse a president, vice-president, and other officers; and the third Friday in every month to transact business, depute fit persons to take subscriptions for the said uses, and of all monies so received to give account to the lord chancellor, &c. They have a standing committee at the chapter-house, to prepare matters for the monthly meeting which is held at St. Martin's library.

SOCIETY for propagating christian knowledge. This was begun in 1699, by some persons of worth, &c. Its original design was to propagate religion in the plantations, to secure the pious education of the poor at home, and to reclaim those that err in the fundamentals of christianity. In the year 1701, they had procured considerable charities, and transmitted the same to the plantations, in libraries, bibles, catechisms, &c. with a voluntary maintenance for several ministers to be employed in the plantations; but the society for propagating the gospel in foreign parts being then instituted, they were incorporated by charter in the same, and thus discharged as a particular society from the further pursuit of that branch of their original design, whereupon they wholly turned themselves to the other, and are now very considerable by great accessions from the clergy and laity. They meet weekly to concert measures for raising charity for educating poor children, and setting up schools for that purpose, as also for the more regular disposal of books for the instruction of the ignorant, erroneous, &c.

For the other societies established by charter, see the articles COLLEGE, COMPANY, and CORPORATION.

SOCIETY, in a commercial sense, the same with partnership or fellowship. See PARTNERSHIP and FELLOWSHIP.

SOCINIANS, in church history, a sect of christian

christian heretics, so called from their founder Faustus Socinus, a native of Sienna, in Italy. He, about the year 1574, began openly to declare against the catholic faith, and taught, 1. That the eternal father was the one only God; that the word was no more than an expression of the godhead, and had not existed from all eternity; and that Jesus Christ was God no otherwise than by his superiority above all creatures who were put in subjection to him by the Father. 2. That Jesus Christ was not a mediator between God and men, but sent into the world to serve as a pattern of their conduct; and that he ascended up to heaven only as it were to take a journey thither. 3. That the punishment of hell will last but for a certain time, after which the body and soul will be destroyed. And, 4. That it is not lawful for princes to make war. These four tenets were what Socinus defended with the greatest zeal. In other matters, he was a lutheran or a calvinist; and the truth is, that he did but refine upon the errors of all the antitrinitarians that went before him. The socinians spread extremely in Poland, Lithuania, and Transylvania. Their sentiments are explained at large in their catechism, printed several times under the title of *Catechesis Ecclesiarum Polonicarum, unum Deum Patrem, illiusque filium unigenitum, una cum Sancto Spiritu, ex sacra scriptura consentitum*. They were exterminated out of Poland in 1655, since which time they have been chiefly sheltered in Holland, where though their public meetings have been prohibited, they find means to conceal themselves under the names of arminians and anabaptists. See the article **ARMINIANS**.

SOCKAGE, or **SOCAGE**. See **SOCAGE**.

SOCKET, **BALL AND SOCKET**. See **BALL**.

SOCKETS in a ship, are the holes which the pintles of the murdering pieces go into.

SOCLE, or **ZOCLE**, in architecture, a flat square member under the bases of pedestals of statues, vases, &c. which serves as a foot or stand. Continued socle is a kind of continued stand or pedestal without either base or cornice, ranging round the whole building, called by Vitruvius *stereobata*.

SOCMEN, or **SOKEMEN**, such tenants as held their lands and tenements in socage; but the tenants in ancient demesne, seem most properly to be called socmans. See the article **SOCAGE**.

SOCNA, in our old writers, denotes some privilege, liberty, or franchise.

SOCOME, is taken for a custom of grinding corn at the lord's mill; whence came the name or term of bond socome, by which the tenants were bound to it; and also love socome, where they did it voluntarily out of love to their lord.

SOCONUSCO, a port-town of Mexico, in North America, capital of the province of that name, situated on the Pacific ocean: west long. 98°, north lat. 15°.

SOCOTORA, an island in the indian ocean, about seventy miles long, and fifty broad, situated in east long. 53°, north lat. 11°.

SOCRATIC PHILOSOPHY, the doctrines and opinions, with regard to morality and religion, maintained and taught by Socrates. By the character of Socrates, left us by the antients, particularly by his scholar Plato, Laertius, &c. he appears to have been one of the best and the wisest persons in all the heathen world. To him is ascribed the first introducing of moral philosophy, which is what is meant by that usual saying, "That Socrates first called philosophy down from heaven to earth;" that is, from the contemplation of the heavens and heavenly bodies, he led men to consider themselves, their own passions, opinions, faculties, duties, actions, &c. He wrote nothing himself, yet all the grecian sects of philosophers refer their origin to his discipline, particularly the platonists, peripatetics, academics, cyrenaics, stoics, &c. but the greatest part of his philosophy we have in the works of Plato. See the article **PLATONISM**, &c.

SODA, or **HEAT of the stomach**, in medicine, the name of a distemper consisting in a heat or troublesome burning about the pit of the stomach, or its left mouth, which sometimes is extended the whole length of the oesophagus, with a pressure or spasmodic constriction, usually attacking the patient by fits. The cause is generally fat aliment, especially veal, if cold drink be taken soon after. In some it proceeds from acids, in others from aromatics, spirituous liquors, or bilious humours. This disorder is generally slight, and vanishes of its own accord, though in others it is of long duration. In the cure, the cause must always be attended to; if from acids, absorbents are proper, particularly crabs-eyes and prepared shells, mixed with a fourth or fifth part of powder of nutmeg given

given to half a dram, as also the tabellæ cardialgicæ. It is common to take chalk alone or mixed with nutmeg; but care should be taken not to be too free in its use. Oil of tartar per deliquium, given from twenty to thirty drops in coffee, tea, broth, or warm beer, is generally efficacious, as also tincture of tartar and spirit of hartshorn. If it proceeds from bilious humours, thirty or fifty drops of dulcified spirit of nitre in water, tea, or coffee, will take away the pain. When it is caused by fat things and draughts of cold liquor, a dram of brandy is good. Now and then laxatives should be given to carry off the humours. In sanguine constitutions, bleeding may be proper.

SODA subethica, among the antient physicians, was a term whereby they expressed a peculiarly sharp and terrible pain of the head.

SODBURY, a market-town of Gloucestershire, situated ten miles north-east of Bristol.

SODDER, or **SOLDER**. See **SOLDER**.

SODOM RUINS, are said to be sometimes seen at the bottom of the lake called the Dead sea, in Palestine: east long. 38°, north lat. 31° 40'.

SODOMY, the unnatural crime of buggery, thus called from the city of Sodom, which was destroyed by fire for the same. The levitical law adjudged those guilty of this execrable crime to death, and the civil law assigns the same punishment to it. Our law also makes it felony. See the article **BUGGERY**.

There is no statute in Scotland against sodomy; the libel of this crime is therefore founded on the divine law, and practice makes its punishment to be burning alive.

SOFA, in the turkish customs, a bench of wood raised from the ground about a foot high, and placed round a hall or chamber for the people to sit down upon, or to lie along, and in that posture to take a view of what passes in the streets, &c. for these benches are surrounded with windows; they are covered with fine turky carpets; and upon that are placed cushions of satin flowered with gold, or some other rich stuff.

SOFALA, the capital of the territory of that name in Africa, situated at the mouth of the river Sofala, in east long. 35°, south lat. 20°.

OFFITA, or **SOFFIT**, in architecture, any plafond or ceiling formed of cross beams of flying corniches, the square

compartiments or pannels of which are enriched with sculpture, painting or gilding; such are those in the palaces of Italy, and in the apartments of Luxembourg at Paris. This word is particularly used for the under side or face of an architrave, and for that of the corona, or larmier, which the antients called lacunar, the French plafond, and we usually the drip. It is enriched with compartments of roses, and has eighteen drops in the doric order disposed in three ranks, six in each, placed to the right-hand of the guttæ, and at the bottom of the triglyphs.

SOFI, or **SOPHI**. See the article **SOPHI**.

SOFTENING, in painting, the mixing and diluting of colours with the brush or pencil. To soften designs in black and white made with the pen, &c. signifies to weaken the tint. To soften a portrait, according to Felibien, is to change some of the strokes, and give a greater degree of sweetness and softness to the air thereof, which before had something rough and harsh in it.

SOGDIANA, a country of Asia, situated on the north side of the river Oxus, which separated it from antient Bactria, now a part of Usbec Tartary.

SOGETTO, **SUBJECT**, in music, is used for a song or melody, above or below which some counterpoint is to be made: a counterpoint above the subject, is when the lower part is the subject; in this sense it is called *canto fermo*. When the counterpoint is made below the subject, the upper part is the subject. If this subject does not change the figure or situation of notes, be it above or below the counterpoint, it is called the *invariable subject*, and if it changes, the *variable subject*. Sogetto is also used for the words to which some composition is to be adapted. And, lastly, this word is made use of for a succession of many notes of one, two, or more measures, disposed in such a manner as to form one or more fugues. See the article **COUNTERPOINT**, &c.

SOHAM, a market-town of Cambridgeshire, situated on a lake called Soham Meer, in the isle of Ely, fourteen miles north-east of Cambridge.

SOIGNIES, a town of the austrian Netherlands, situated in the province of Hainault, ten miles north-east of Mons.

SOIL, *solum*, in agriculture and gardening, denotes earth or ground considered with regard to the quality of its mould

for

for the production and growth of vegetables. See the article EARTH.

The land of England, as considered by the farmer, is reduced into nine sorts of soil: the sandy, the gravelly, the chalky, the stony, the rocky, the hazely, the black earth, the marsh, and the clay-land. See the articles SAND, GRAVEL, &c.

Mortimer observes, that these soils, in many places, are mixed and blended together, and that where it is so, it is much better than where they are separate or single; especially where the mixtures happen to be of a right kind, as those of the hot and the dry soils blended with the cold and the moist. Nature does this often, and art may imitate it. All sands are hot, and all clays are cold, and therefore the laying clay upon sandy lands, and sand upon clayey lands, is the best of all manure: this alters and changes for the better the very nature of the land itself, whereas dung only improves it for a time, and after that leaves it as bad as it was before. Mixt soils, that tend to the clayey-kind, are the best of all others for corn. It is not only the natural soil we are to consider, but the depth of it, and what soil is underneath; for the richest soil, if it be only eight or ten inches deep, and lies upon a cold clay, or upon stone, will not be so fruitful to the farmer as the leaner soil that lies upon better understrata. Gravel or sand are the best understrata of all others, to make the land above prolific.

Cold and wet clays are much more fruitful in the southern parts of England, than in the north. The climates, therefore, are to be considered, and the quantities or proportions of the different kinds in the mixed soils.

The greatest article, in the culture of plants, trees, &c. is the soil; and in many cases it is not sufficient, when having found a soil, which once tried proves convenient, to suppose that it will always continue so. In track of time the soil, which was once proper for the nourishment of some peculiar vegetable, loses its virtue; and this sooner in some lands, and later in others. All who are conversant in husbandry, are well acquainted with this. If a good piece of ground be chosen for the sowing of wheat, and it produces very well the first year, it will not for ever continue to do so; the second year's crop will be perhaps good, and the third and fourth tolerable: all

this while the land is in heart, as the farmers express it, but after this it becomes improper, and very little wheat will be raised if sown upon it; yet when it refuses to produce wheat, it will, without any alteration, produce barley in sufficient plenty for some years; when it will yield no more good crops of barley, it may be still sowed with oats, and will produce that grain as well as fresh land; and when it has been worn out with all these, it will produce pease. After this it is made quite barren, and can be of no farther use to the farmer, the vegetative quality of it being worn off by these successive crops, each sort of grain taking off that part which is more peculiarly fitted for its own nourishment; the wheat first, and the rest in their order.

Mr. Tull thinks, that the only difference of soil, except the richness, seems to be the different heat and moisture it has; for that if these be rightly adjusted, any soil will nourish any sort of plant; for let thyme and rushes change places, and both will die; but let them change their soil, by removing the earth wherein the thyme grew from the dry hill down to the watry bottom, and plant rushes therein, and carry the moist earth wherein the rushes grew up to the hill, and there thyme will grow in the earth that was taken from the rushes, and so will the rushes grow in the earth that was taken from the thyme; so that it is only more or less water that makes the same earth fit for the growth of thyme or rushes; for our earth, when it has in the stove the just degree of heat that each sort of plant requires, will maintain plants brought from both the Indies.

The same writer observes, that as we have no way to enrich the soil but by pulveration of manure, or of instruments, so nature has ordained that the soil shall be exhausted by nothing but by the roots of plants.

There is a kind of hazely earth, Mortimer observes, with a redish cast, frequent in Essex and some other countries, which approaches to the nature of loam, and is called by the farmers brickish-soil: the best produce of this earth is rye; if well dug it will bear white-oats, turnips, barley, wheat, buck-wheat, and pease; the natural produce in weeds, is broom, fern, quitch-grass, and the like. If it be well dunged, it will produce large crops of clover, but it soon wears out of it, and therefore should be sowed mixed with
rye

rye-grass. The best manure for these lands is chalk mixed with coal-ashes; marle makes a great improvement in them, and there is a stiff yellow kind of clay that moulders with the frost, and answers the same purpose.

SOISSONS, a city of France, in the province of the isle of France, situated on the river Aysé, fifty-five miles north-east of Paris.

SOIT FAIT COMME IL EST DESIRÉ', *be it done as it is desired*, a form used when the king gives the royal assent to a private bill preferred in parliament.

SOK, SOKE, or SOC, in our antient customs. See the article **SOC**.

SOL, in music, the fifth note of the gammut, *ut, re, mi, fa, sol, la*. See **GAMMUT**.

SOL, or **SOU**, a french coin made up of copper mixed with a little silver. See the article **COIN**.

SOL, the **SUN**, in astronomy, astrology, &c. See the article **SUN**.

SOL, in chemistry, is gold, thus called from an opinion that this metal is in a particular manner under the influence of the sun. See the article **GOLD**.

SOL, in heraldry, denotes **Or**, the golden colour in the arms of sovereign princes. See the article **OR**.

SOLÆUS, or **SOLARIS**, in anatomy, one of the extensor muscles of the foot, rising from the upper and hinder part of the tibia and fibula. This is a large and fat muscle, thicker at the middle than at the edges, and is nearly of an oval figure.

SOLANUM, **NIGHT-SHADE**, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of a single rotated petal; the fruit is a round smooth berry, punctuated at the top, and formed into two cells; the receptacle is fleshy and convex on both sides, and the seeds are numerous and roundish.

This genus comprehends the solanum, melongena and lycopersicon of authors; or the common night shade, the woody night shade, the love-apple, and the mad-apple, &c.

Common night-shade is used to allay inflammations, to soften and relax the fibres which undergo too violent a tension; they apply the bruised herb to the piles, or bathe the part with the juice a little warmed: this juice is said to be proper in wounds where the blood is extravasated and grumous; it is also sudorific and diuretic, expelling gravel from the kidneys.

Some years ago, the internal use of the

solanum was much recommended by some writers, in cancerous cases, foul ulcers, and scorbutic eruptions: however later experience has found this simple to be not only of little or no efficacy in such cases, but to be attended with actual danger to the patient.

SOLAR, something belonging to the sun: thus the solar system is that system of the world wherein the heavenly bodies are made to revolve round the sun as the center of their motion. See **COPERNICAN**. Also the solar year is that consisting of three hundred and sixty-five days, five hours, and forty-nine minutes, in opposition to the lunar year, consisting of three hundred and fifty-four days. See **YEAR**. For the solar month, solar cycle, solar eclipse, &c. see the articles **MONTH**, **CYCLE**, **ECLIPSE**, &c.

SOLDAN. See the article **SULTAN**.

SOLDANIA BAY, a bay of the Atlantic ocean, situated on the south-west coast of Africa, in east long. 15°, south latitude 33° 30'.

SOLDANELLA, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of a single petal of a campanulated form, and jagged at the edge; the fruit is an oblong cylindric capsule, obliquely striated, containing only one cell, and opening in ten places at the point; the seeds are numerous, acuminate, and small; the receptacle columnar and free.

SOLDER, **SODDER**, or **SODER**, a metallic or mineral composition used in soldering or joining together other metals. See the next article.

Solders are made of gold, silver, copper, tin, bismuth, and lead; usually observing, that in the composition there be some of the metal that is to be soldered mixed with some higher and finer metals. Goldsmiths usually make four kinds of solder, *viz.* solder of eight, where to seven parts of silver there is one of brass or copper; solder of six, where only a sixth part is copper; solder of four, and solder of three. It is the mixture of copper in the solder that makes raised plate come always cheaper than flat. The solder used by plumbers is made of two pounds of lead to one of block-tin. Its goodness is tried by melting it and pouring the bignets of a crown-piece upon a table; for if good, there will arise little bright shining stars therein. The solder for copper is made like that of the plumbers, only with copper and tin; for very nice

works, instead of tin they sometimes use a quantity of silver. Solder for tin is made of two thirds of tin and one of lead; but where the work is any thing delicate, as in organ pipes, where the juncture is scarce discernable, it is made of one part of bismuth and three parts of pewter.

SOLDERING, among mechanics, the joining and fastening together two pieces of the same metal, or of two different metals, by the fusion and application of some metallic composition on the extremities of the metals to be joined. See the last article. To solder upon silver, brass or iron; take silver, five penny-weight; brass, four penny-weight; melt them together for soft solder, which runs soonest. Take silver, five penny-weight; copper, three penny-weight; melt them together for hard solder. Beat the solder thin, and lay it on the place to be soldered, which must be first fitted and bound together with wire, as occasion requires; then take borax in powder, and temper it like pap, and lay it upon the solder, letting it dry; then cover it with quick coals, and blow, and it will run immediately; take it presently out of the fire, and it is done. It is to be observed, that if any thing is to be soldered in two places, which cannot well be done at one time, you must first solder with the harder solder, and then with the soft; for if it be first done with the soft, it will unfold again before the other is soldered. Let it be observed, that if you would not have your solder run about the piece that is to be soldered, you must rub such places over with chalk.

In the soldering either of gold, silver, copper, and all the metals before-mentioned, there is generally used borax in powder, and sometimes rosin. As to iron, it is sufficient that it be heated red hot, and the two extremities thus hammered together, by which means they will become incorporated into one another.

SOLDIER, a military man listed to serve a prince or state, in consideration of a certain daily pay.

The soldiers are properly the land forces of a kingdom or state; but in England it is against the antient law to keep an army of soldiers in time of peace. Where any soldier that is lawfully retained shall depart from his colours without licence, he is declared to be guilty of felony by 18 Hen. VI. c. 9. and

every soldier who either causes a mutiny or deserts the service, shall be punished with death or otherwise, as a court-martial shall think fit. Also persons suspected of desertion, are to be apprehended by constables, who shall be allowed a reward of 20s. for every such deserter. See the article **DESERTER**.

By the 4 Geo. I. c. 4. it is ordained, that no soldier shall be taken out of the service by any process at law, unless it be for some criminal matter, or where the debt he owes amounts to 10l. at the least, of which affidavit is to be made, &c. Soldiers must be quartered in inns and alehouses only, and not in private houses, without the consent of the owners, under certain penalties; and where victuallers refuse soldiers quartered on them, or constables receive any reward for excusing their neglect, they forfeit a sum not above 5l. nor under 30s. by 3 Geo. II. c. 2. A person enlisted for a soldier, within four days after, is to be carried before the next justice or chief magistrate of a town, and is to declare his assent that he listed voluntarily, &c. but if he then dissents thereto, on his returning the money received, and paying 20s. he may be discharged. In case any subject of Great Britain or Ireland shall list or enter himself, or procure any one to be enlisted a soldier to go beyond the seas, without leave obtained from his majesty, such person shall be punished as a felon by 8 and 9 Geo. II. There are acts annually made for punishing mutiny, &c. of soldiers and false musters, and for the better payment of the army and their quarters, &c. See **COURT-MARTIAL**.

SOLDURII, in antiquity, a kind of military clients or retainers to the great men in Gaul, particularly in Aquitania, mentioned by Cæsar. The soldurii were people who shared all the good and ill fortune of their patrons, to whom if any disaster happened, they either underwent the same, or killed themselves; and Cæsar assures us, that no one had been ever known to refuse the alternative. Vigener takes them to have been more than common soldiers, and to be even gentlemen in pension, or appointment.

SOLE, in the manege, a nail or sort of horn under a horse's foot, which is much more tender than the other horn that incompasses the foot, and by reason of its hardness is properly called the horn or hoof. A horse's shoe ought to be so set upon the hoof as not to bear upon the sole,

sole, for otherwise the sole would be hurt, and not only make the horse lame, but corrupt the flesh that separates it from the coffin-bone. To take out the sole, is to do it without touching the horn of the hoof; or if you take off the horn, you make a hoof-cast.

SOLEA, the SOAL FISH. See SOAL.

SOLEÆ, among the Romans, a kind of sandals or slippers, which covered only the sole of the feet, and were bound on with thongs of leather, instead of which the women and the effeminate ones of the other sex tied them on with purple-coloured ribbons, or such as were variously adorned with gold and silver.

SOLECISM, *solecismus*, in grammar, a false manner of speaking contrary to the use of language and the rules of grammar, either in respect of declension, conjugation, or syntax.

SOLEMN, *solemnis*, something performed with much pomp, ceremony, and expence; thus we say, solemn feasts, solemn funerals, solemn games, &c. See the articles FEAST, FUNERAL, &c. In law, solemn signifies something authentic, or that is clothed in all its formalities.

SOLEN, or RAZOR-SHELL, in ichthyology, a genus of shells of a bivalve, oblong and somewhat rounded figure, with both the extremities open; the animal inhabiting it is a tethys. See the article TETHYS.

There are several species of the solen, some whereof are straight, others crooked, some red, others variegated with brown and blue, some brown and white, others of a violet-purple-colour: this last is a beautiful smooth shell, from three to six inches long, and from one third to three quarters of an inch in diameter. There is also another not inelegant species, variegated with brown and blue, and a little arcuated. See plate CCLV. fig. 3.

SOLET and DEBET, words used in writs, &c. to recover rights, &c. See DEBET.

SOLE-TENANT, one that holds lands, &c. in his own right only, without any other person joined. A person must be seized of a sole estate to devise the same by will, or for the wife to have a dower therein, &c. And where a man and his wife hold land for their lives, the remainder to their son, in that case if the man dies the lord shall not have heriot, because he does not die sole-tenant.

SOLEFAING, in music, the naming or pronouncing the several notes of a song by

the syllables *u', re, mi, fa sol, &c.* and in learning to sing it.

Of the seven notes in the french scale *ut, re, mi, fa, sol, la, si*, only four are used among us in singing, as *mi, fa, sol, la*: their office is principally in singing, that by applying them to every note of the scale, it may not only be pronounced with more ease, but chiefly that by them the tones and semitones of the natural scale may be better marked out and distinguished. This design is obtained by the four syllables *fa, sol, la, mi*. Thus from *fa* to *sol* is a tone, also from *sol* to *la*, and from *la* to *mi*, without distinguishing the greater or less tone; but from *la* to *fa*, also from *mi* to *fa*, is only a semitone. If then these be applied in this order, *fa, sol, la, fa, sol, la, mi, fa, &c.* they express the natural series from C; and if that be repeated to a second or third octave, we see by them how to express all the different orders of tones and semi-tones in the diatonic scale; and still above *mi* will stand *fa, sol, la*, and below it the same inverted *la, sol, fa*, and one *mi* is always distant from another an octave, which cannot be said of any of the rest, because after *mi* ascending come always *fa, sol, la, fa*, which are repeated invertedly descending.

To conceive the use of this, it is to be remembered, that the first thing in learning to sing, is to make one raise a scale of notes by tones and semi-tones to an octave, and descend again by the same; and then to raise and fall by greater intervals at a leap, as thirds and fourths, &c. and to do all this by beginning at notes of different pitch. Then those notes are represented by lines and spaces, to which these syllables are applied, and the learners taught to name each line and space thereby, which makes what we call sol-faing, the use whereof is, that while they are learning to tune the degrees and intervals of sound, expressed by notes on a line or space, or learning a song to which no words are applied, they may not only do it the better by means of articulate sounds, but chiefly, that by knowing the degrees and intervals expressed by those syllables, they may more readily know the places of the semi-tones, and the true distance of the notes. See SINGING.

SOLICITOR, or SOLLICITOR, *solicitor*, a person employed to take care of, and manage suits depending in the courts of law or equity; and those of the lower sort, it is observed, are too often made

use of, to the damage of the people, and the increase of champerty and maintenance. Solicitors are within the statute to be sworn and admitted by the judges, before they are allowed to practise in our courts, in like manner as attorneys.

There is also a great officer of the law, next to the attorney-general, who is stiled the king's solicitor-general; who holds his office by patent, during the king's pleasure; has the care and concern of managing the king's affairs, and has fees for pleading, besides other fees arising by patents, &c. He hath his attendance on the privy council; and the attorney-general and he were antiently reckoned among the officers of the exchequer; they have their audience, and come within the bar in all other courts.

SOLID, in philosophy, a body whose parts are so firmly connected together, as not to give way, or slip from each other upon the smallest impression: in which sense solid stands opposed to fluid. See the article **FLUID** and **BODY**.

Geometricians define a solid to be the third species of magnitude, or that which has three dimensions, *viz.* length, breadth, and thickness or depth.

A solid may be conceived to be formed by the revolution, or direct motion, of a superficies of any figure whatever, and is always terminated or contained under one or more planes or surfaces, as a surface is under one or more lines.

Solids are commonly divided into regular and irregular. The regular solids are those terminated by regular and equal planes, and are only five in number, *viz.* the tetrahedron, which consists of four equal triangles; the cube, or hexahedron, of six equal squares; the octahedron, of eight equal triangles; the dodecahedron, of twelve; and the icosihedron, of twenty equal triangles. See the articles **TETRAHEDRON**, **CUBE**, &c.

The irregular solids are almost infinite, comprehending all such as do not come under the definition of regular solids; as the sphere, cylinder, cone, parallelogram, prism, parallelopiped, &c. See the articles **SPHERE**, **CYLINDER**, &c.

SOLID of least resistance. Sir Isaac Newton, in his Principia, shews, that if there be a curve figure, as DNEG (plate CCLVI. fig. 1.) of such a nature, as that from any point, as N, taken in its circumference, a perpendicular NM be let fall on the axis AB; and if from a

given point, as G, there be drawn the right line GR, parallel to a tangent to the curve in the point N, cutting the axis produced in R, and the proportion then be, as NM:GR::GR³:4BG×GR; the solid generated by the revolution of this curve about its axis AB, when moved swiftly in a rare and elastic medium, will meet with less resistance from the medium, than any other circular solid whatever, of the same length and breadth.

SOLID ANGLE, is that formed by three or more planes meeting in a point, like the point of a diamond well cut.

SOLID BASTION. See **BASTION**.

SOLID NUMBERS, are those which arise from the multiplication of a plane number, by any other whatsoever; as 18 is a solid number made of 6 (which is plane) multiplied by 3; or of 9 multiplied by 2.

SOLID PROBLEM, in mathematics, is one which cannot be geometrically solved unless by the intersection of a circle and a conic section; or, by the intersection of two other conic sections, besides the circle.

As to describe an isosceles triangle on a given right line, whose angle at the base shall be triple to that at the vertex.

This will help to inscribe a regular heptagon in a given circle; and may be resolved by the intersection of a parabola, and a circle.

This problem also helps to inscribe a nonagon in a circle; and may be solved by the intersection of a parabola, and an hyperbola between its asymptotes, *viz.*

To describe an isosceles triangle, whose angle at the base shall be quadruple of that at the vertex.

And such a problem as this hath four solutions, and no more; because two conic sections can cut one another but in four points.

Line of SOLIDS, on the sector. See the article **SOLIDS**.

SOLIDS, in anatomy, &c. denote the continent parts of the human body; being a congeries of pipes, or vessels, which contain a liquor.

The solid parts of the body, though equally composed of vessels, are different with regard to their consistence; some being hard, and others soft. The hard, as the bones and cartilages, give firmness and attitude to the body, and sustain the other parts: the soft parts, either alone, or together with the hard, serve to execute the animal functions.

Fig. 1. SOLID of least resistance

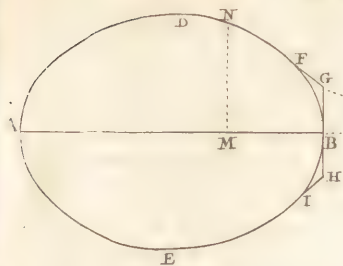


Fig. 2. SOLIDAGO, GOLDEN ROD



Fig. 3. Sonchus, the Sow-THISTLE



Fig. 4. The Reed - Sparrow



Fig. 5. SPATULA

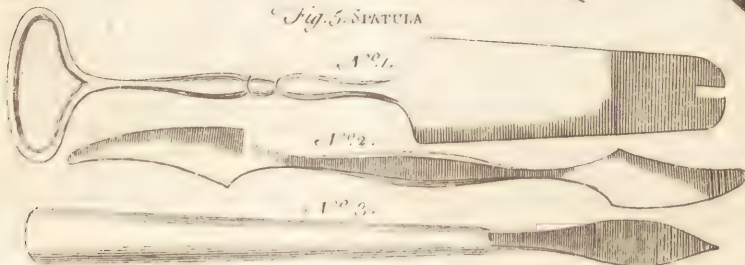


Fig. 5. Spatula



The solids are commonly divided into similar or simple; and dissimilar, compounded, or organic. The similar parts are the fibres, membranes, bones, cartilages, ligaments, muscles, tendons, aponeuroses, glands, arteries, veins, nerves, the secretory and excretory canals, and the common integuments. See the articles *FIBRE*, *MEMBRANE*, &c.

The dissimilar are such as are composed of the former, as the viscera and other parts of the body, *viz.* the head, neck, thorax, abdomen, and extremities: every one of which is again subdivided into lesser portions. See the articles *HEAD*, *THORAX*, *INTESTINES*, &c.

SOLIDAGO, *GOLDEN ROD*, in botany. a genus of the syngenesia-polygamia-superflua class of plants, the receptacle of which is naked, the down simple, and the radii of each corollula about five in number: add to this, that the squamæ of the cup are imbricated and closed.

The flowers of the golden-rod are of the radiated kind, the disc of which is covered with floscules and semi-floscules, as represented in plate CCLVI. fig. 2.

Golden-rod grows wild in heaths and woods, producing spikes of yellow flowers in August: its leaves, which have a moderately astringent and bitter taste, are esteemed good in disorders arising from debility and laxity of the viscera.

SOLIDITY, *soliditas*, that property of matter, or body, by which it excludes all other bodies from the place which itself possesses: and as it would be absurd to suppose, that two bodies could possess one and the same place at the same time, it follows, that the softest bodies are equally solid with the hardest. See the articles *MATTER* and *IMPENETRABILITY*.

Among geometricians, the solidity of a body denotes the quantity or space contained in it, and is called also its solid content, which may be seen under the several articles *CUBE*, *CYLINDER*, *SPHERE*, *PYRAMID*, *CONE*, &c.

SOLIDITY, in architecture, is applied both to the consistence of the ground, whereon the foundation of a building is laid; and to a massiveness in masonry, of extraordinary thickness, without any cavity within.

SOLILOQUY, *soliloquium*, a reasoning or discourse which a man holds with himself; or, more properly, according to Papias, it is a discourse by way of answer

to a question, that a man proposes to himself.

Soliloquies are become very common things on the modern stage; yet can nothing be more inartificial, or more unnatural, than an actor's making long speeches to himself, to convey his intentions to the audience. Where such discoveries are necessary to be made, the poet should rather take care to give the dramatic persons such confidants as may necessarily share their inmost thoughts, by which means they will be more naturally conveyed to the audience: yet is even this a shift, an accurate poet would not be found to have occasion for. The use and abuse of soliloquies is well delivered by the duke of Buckingham, in the following lines:

Soliloquies had need be very few,
Extremely short, and spoke in passion too.
Our lovers talking to themselves, for want
Of others, make the pit their confidant:
Nor is the matter mended yet, if thus
They trust a friend, only to tell it us.

SOLINGEN, a town of Germany, in the circle of Westphalia and dutchy of Berg, fifteen miles south-east of Dusseldorp.

SOLIS VIA. See the article *VIA*.

SOLITARY, *solitarius*, something retired, or in private, remote from the company or commerce of others of the same species.

SOLITARIES, a denomination of nuns of St. Peter of Alcantara, instituted in 1776, the design of which is to imitate the severe penitent life of that saint: thus they are to keep a continual silence, never to open their mouths to any body but themselves; employ their time wholly in spiritual exercises, and leave the temporal concerns to a number of maids, who have a particular superior in a separate part of the monastery: they always go bare-footed, without sandals; gird themselves with a thick cord, and wear no linen.

SOLITAUROLIA. See the article *SVOVETAUROLIA*.

SOLMS, the capital of the county of Solms, in the landgraviate of Hesse-Cassel, in Germany, thirty-five miles north of Frankfurt.

SOLO, in music, a term used in pieces consisting of several parts, to mark those that are to perform alone: it is sometimes denoted by S.

When two or three parts play, or sing, separately from the grand chorus, they

are called a *dio foli*, a *tre foli*, &c.

SOLOMON'S ISLAND, a cluster of islands in the Pacific ocean, situated between 130° and 140° west longit. and between 7° and 12° south latitude.

SOLOMON'S SEAL, in botany. See the article **POLYGONATUM**.

SOLOTHURN, or **SOLEURE**, one of the cantons of Switzerland, lying between those of Basil and Bern, the former on the north, and the latter on the south. The city of Solothurn, capital of the said canton, is situated in east long. $7^{\circ} 15'$, and north lat. $47^{\circ} 18'$.

SOLSTICE, in astronomy, that time when the sun is in one of the solstitial points; that is, when he is at his greatest distance from the equator, thus called, because he then appears to stand still, and not to change his distance from the equator for some time; an appearance owing to the obliquity of our sphere, and which those living under the equator are strangers to. The solstices are two in each year, the æstival or summer-solstice; and the hyemal or winter-solstice: the summer-solstice is when the sun seems to describe the tropic of cancer, which is on June 22, when he makes the longest day: the winter-solstice is when the sun enters the first degree, or seems to describe the tropic of capricorn, which is on December 22, when he makes the shortest day. See the article **TROPICS**.

This is to be understood as in our northern hemisphere; for in the southern, the sun's entrance into capricorn makes the summer-solstice, and that into cancer the winter-solstice. See **GLOBE**.

The two points of the ecliptic, wherein the sun's greatest ascent above the equator, and his descent below it, are terminated, are called the solstitial points; and a circle, supposed to pass thro' the poles of the world, and these points, is called the solstitial colure. See the article **COLURES**.

The summer-solstitial point is in the beginning of the first degree of cancer, and is called the æstival or summer-point; and the winter-solstitial point is in the beginning of the first degree of capricorn, and is called the winter-point. These two points are diametrically opposite to each other.

SOLVENT, the same with dissolvent. See the article **DISSOLVENT**.

SOLUTION, in chemistry, denotes an intimate mixture of solid bodies with fluids, so as seemingly to form one homogeneous

liquor: the dissolving fluid is termed the dissolvent or menstruum. See the articles **DISSOLVENT** and **MENSTRUUM**. The principles of solution have been already explained under the article **MENSTRUUM**.

As to the manner of affecting solutions, it varies according to the different solvents used for that purpose, and is reduced to the following heads by Boerhaave: 1. Solution is performed by water, by diluting, infusing, boiling, distilling, mixing, fermenting, putrefying, and separating. 2. With oil, by diluting, infusing, boiling, distilling, mixing, separating; but not by fermenting, or by putrefying. 3. With fire, by calcining, roasting, burning, melting, subliming, mixing, separating, and promoting several other operations. 4. With the assistance of air, by fermenting, putrefying, agitating, exciting, and adding other parts capable of dissolving. 5. With fermented spirits, by diluting, infusing, boiling, distilling, mixing, and making oils thinner. 6. With alkaline salts, by calcining, torrefying, burning, melting, mixing, and separating, according to the various force of a dry fire employed. 7. By volatile alkaline salts, by subliming in the dry way; and by diluting, distilling, and digesting in the moist way. 8. With fixed alkaline salts, assisted and moved by water and fire, by digesting, boiling, diluting, separating, and mixing. 9. With fixed acid salts, as those of alum, sulphur, and vitriol; either separately in a liquid form, or in their calxes, by diluting, boiling, distilling, digesting: or in a dry form, by calcining, roasting, burning, and distilling. 10. With volatile acid salts, by diluting, digesting, distilling and insinuating. 11. With compound salts and soaps, by calcining, subliming, distilling, and digesting, either in a dry or a liquid form. 12. With metals, by fusion and amalgamation. See the articles **DILUTING**, **DISTILLING**, &c.

In pharmacy, however, the principal menstrua are water, vinous spirits, oils, and acid and alkaline liquors.

Water is the dissolvent of all salts, vegetable gums, and of animal jellies: of the first it dissolves only a determinate quantity, though of one kind of salt more than another; and being thus saturated, leaves any additional quantity of the same salt untouched: but it is never saturated with the two latter, uniting readily

dily with any proportions of them, and forming, with different quantities, liquors of different consistencies. When assisted by trituration, it likewise dissolves the vegetable gummy resins, as ammoniacum and myrrh; the solutions of which though imperfect, or not transparent; but turbid and of a milky hue, are nevertheless applicable to valuable purposes in medicine.

Redified spirit of wine dissolves the essential oils and resins of vegetables, the pure distilled oils of animals, and soaps; though it does not act upon the expressed oil and fixed alkaline salt of which soap is made: it also, by the assistance of heat, dissolves volatile alkaline salts, but more especially the neutral ones, as the sal diureticus, &c.

Oils dissolve vegetable resins and balsams, wax, animal fats, mineral bitumens, sulphur, and certain metallic substances, particularly lead: however, the expressed oils are more powerful menstrua for most of these bodies, than the oils obtained by distillation; because the former are more capable of sustaining, without injury, a strong degree of heat, which, in most cases, is necessary to enable them to act. Acids dissolve alkaline salts and earths, and metallic substances: however, the different acids differ greatly in their action upon these last. The vegetable acids dissolve a considerable quantity of zinc, iron, copper, and tin; and extract so much from the metallic part of antimony as to become powerfully emetic: they likewise dissolve lead, if previously calcined; but more copiously, if corroded by their steam. The marine acid dissolves zinc, iron, and copper; and though it scarce acts upon any other metallic substance, in the common way, may nevertheless be artfully combined with them all, except gold: such is the corrosive sublimate of the shops. The nitrous acid is the common menstruum of all metallic substances, except gold and the antimonial semi-metal, which are soluble only in a mixture of the nitrous and marine acids, called aqua regia. The vitriolic acid easily dissolves zinc, iron, and copper: and may be made to corrode, or imperfectly dissolve, most of the other metals. See ACID.

Alkaline lixivia dissolves oils, resins, and sulphur; but their power is greatly promoted by the addition of quick-lime, as is evident in the making of soap and the common caustics. Thus assisted, they reduce the flesh, bones, and other solid

parts of animals, into a gelatinous matter. Solutions made in water and in spirit of wine, possess the virtues of the bodies dissolved: whereas oils generally blunt its activity, and acids and alkalies alter natural qualities. Hence watery and spirituous liquors are the only proper menstrua of the native virtues of vegetable and animal matters.

Most of the foregoing solutions are easily effected by pouring the menstruum on the body to be dissolved, and suffering them to stand together, for some time, exposed to a suitable warmth: a strong heat is generally necessary to enable oils and alkaline liquors to perform their office. The action of acids is usually accompanied with heat, effervescence, and a copious discharge of fumes. And as the fumes, which arise during the dissolution of some metals in the vitriolic acid, prove inflammable, the operator ought to be careful, lest, by the imprudent approach of a candle, the exhaling vapour be set on fire.

Solution is much facilitated, by powdering such tenacious bodies as are friable; and slicing, or rasping, into small parts such whose texture does not admit of being powdered: this, in some cases, is of such importance, that the operation proves extremely tedious, if it be neglected. In solutions of metals, earths, or salts, with acid spirits, care should be taken not to mix them too hastily, otherwise the ebullition will cause the mixed liquor to overflow the vessels; and, in some cases, the unmanageable heat, together with the noxious fumes, will give the operator great embarrassment.

But besides the solutions made by adding fluid menstrua to the bodies to be dissolved, there is another kind, called deliquation, or solution per deliquium, in which the moisture of the air is the menstruum. It is performed by exposing the matter to be dissolved to the air, in cellars, or other damp places; for fixed alkaline and neutral salts, and some metallic salts, being thus exposed, attract its humidity, and at length become liquid. Some substances, not dissoluble by the application of water in its grosser form, as the butter of antimony, are easily liquified by this slow action of the aerial moisture. See ANTIMONY.

SOLUTION, in algebra and geometry, is the answering a question, or the resolving any problem proposed. See the articles **ALGEBRA** and **GEOMETRY**.

SOLU-

SOLUTION of continuity, in surgery, is the separation of the natural cohesion of the solid parts of the body, by a wound.

See **CONTINUITY** and **WOUND**.

SOLUTIVE, an appellation given to laxative and loosening medicines. See the article **LAXATIVE MEDICINES**.

Solutive tartar is a preparation of tartar, made by boiling eight ounces of cream of tartar with four ounces of fixed salt of tartar. See the article **TARTAR**.

SOMERSETSHIRE, a county of England, situated on the Bristol-channel, and bounded by Wiltshire, on the east; by Dorsetshire, on the south; and by Devonshire, on the west: it is famous for the cloth manufacture.

SOMERTON, a market-town of Somersetshire, twelve miles south of Wales.

SOMME, a river of France, which running from east to west through Picardy, by Amiens and Abbeville, falls into the British-channel near St. Vallery.

SOMMIERS, a town of Languedoc, in France, fourteen miles north-east of Montpellier.

SOMNAMBULI, in medicine, persons who walk in their sleep, otherwise called noctambuli. See **NOCTAMBULI**.

SOMNIFEROUS, or **SOPORIFEROUS**. See the article **SOPORIFIC**.

SOMNOLENTUM COMA, in medicine. See the article **COMA**.

SON, *filius*, an appellation given to a male child, considered in the relation he bears to his parents.

A bastard is termed an illegitimate, or natural son. See **BASTARD**.

SONATA, in music, a piece, or composition, intended to be performed by instruments only; in which sense it stands opposed to cantata, or a piece designed for the voice. See **CANTATA**.

There are sonatas from one to eight parts, but usually they are performed by a single violin, or with two violins and a thorough bass for the harpsichord, and frequently a more figured bass for the bass-viol.

Sonatas, though extremely numerous, are reduced by the Italians to two kinds:

1. Those proper for church-music, which usually begin with a grave and solemn motion, and afterwards strike into a brisker and gayer manner: these are what they more peculiarly call sonatas. 2. Those for the chamber, being little pieces for dancing.

SONCHUS, the sow-THISTLE, in botany, a genus of the syngenesia-polygamia-æqualis class of plants, the compound

flower of which is imbricated and unguiform; and the lesser corollulæ of which it is composed, monopetalous, linear and quinquevulvate: the stamina are five very short capillary filaments: there is no pericarpium but the cup, which closes for that purpose, and within it are the seeds, somewhat oblong, winged with down, and affixed to the thalamus, or receptacle. See plate CCLV. fig. 3.

Sonchus is accounted cooling and attenuant, and accordingly prescribed in the stranguries, as also in inflammations of all kinds, to be applied externally in the form of a cataplasm.

SONCINO, a town of the dutchy of Milan, in Italy, thirty-three miles east of the city of Milan.

SONDRIO, a town of the Grisons, being the capital of the Valteline: east long. 9° 50', north lat. 46° 15'.

SONG, in poetry, a little composition, consisting of easy and natural verses, set to a tune in order to be sung.

The song much resembles the madrigal, and still more the ode, which is nothing but a song according to the antient rules. See the articles **MADRIGAL** and **ODE**.

The subject of a song is usually love or wine; whence M. le Brun defines a modern song to be either a soft and amorous, or a lively and bacchic thought, expressed in a few words. But, be the subject of the song what it will, the verses are to be easy, flowing, and natural, and must contain a certain harmony which neither shocks the reason or the ear, and which unites poetry and music agreeably together.

SONG, in music, is applied in general to a single piece of music, whether contrived for the voice or an instrument. See the article **COMPOSITION**.

A song, says Mr. Malcolm, may be compared to an oration: for as, in this latter, there is a subject, viz. some person or thing the discourse is referred to, and which is always to be kept in view through the whole; so, in every regular and melodious song, there is one note which regulates the rest; wherein the song begins, and at last ends; and which is, as it were, the principal matter, or musical subject, to be regarded in the whole course of the song; and this principal or fundamental note is called the key of the song. See the article **KEY**.

SONNA, a book of mahometan traditions, wherein all the orthodox misfulmen are required to believe. See **SONNITES**.

SON-

SONNET, in poetry, a composition contained in fourteen verses, viz. two stanzas, or measures, of four verses each, and two of three; the eight first verses being all in three rhimes.

The sonnet is of Italian origin, and Petrarch is allowed to be its father. It is held the most difficult and artful of all compositions, as requiring the utmost accuracy and exactness. It should end with some pretty and ingenious thought, and its close should be particularly beautiful, otherwise the sonnet is naught.

SONNITES, among the mahometans; an appellation given to the orthodox musfulmen, or true believers; in opposition to the several heretical sects, particularly the schiites, or followers of Ali.

The sonnites are so called from their believing in the sonna, or book of mahometan traditions; which the schiites reject as apocryphal. The Turks assume the name of sonnites in opposition to the Persians, who are schiites.

SOOP, or **SOUP**. See the article **SOUP**.

SOOT, *fuligo*, a volatile matter, arising from wood, and other fuel, along with the smoke; or rather, it is the smoke itself, fixed and gathered on the sides of the chimney.

Wood-soot is of a shining black colour, a disagreeable smell, and an acrid, bitter and nauseous taste; its chief use, for medicinal purposes, being in hysterical cases, in which it is sometimes exhibited in conjunction with the fetid gums.

The volatile salt and spirit of foot are, when sufficiently purified, not different in quality from those of animal substances; though some prefer them in nervous complaints, and particularly in epileptic cases. The tincture of soot is made thus: take of wood-soot, two ounces; of asa foetida, one ounce; and proof-spirit, two pints: digest and strain. It is good not only in hysterical cases, but also in epilepsies, and other nervous disorders.

Soot makes an excellent manure for cold lands that have been over-run with moss; but the soot of sea-coals is better for this purpose than that of wood. The dyers also make considerable use of soot, for a dun-colour.

SOPE, or **SOAP**. See the article **SOAP**.

SOPHI, or **SOFI**, a title given to the emperor of Persia; importing as much as wise, sage, or philosopher. There is no prince in the world whose authority is

more absolute than that of the sopher of Persia.

SOPHIA is also a city of Turkey, in Europe, in the province of Bulgaria: east long. 24°, north lat. 42° 30'.

SOPHISM, *σοφισμα*, in logic, &c. an argument which carries much of the appearance of truth, and yet leads into error. There is some need of a particular description of these fallacious arguments, that we may with more ease and readiness detect and solve them.

1. The first sort of sophism is called *ignoratio elenchi*; or a mistake of the question.
2. The next sophism is called *petitio principii*, or a supposition of what is not granted.
3. That sort of fallacy which is called a circle, is very near a-kin to the *petitio principii*.
4. The next sort of sophism is called *non causa pro causa*, or the assignation of a false cause.
5. The next is called *fallacia accidentis*, or a sophism, wherein we pronounce concerning the nature and essential properties of any subject, according to something which is merely accidental to it.
6. The next sophism borders upon the former; and that is when we argue from that which is true, absolutely, simply, and abstracted from all circumstances: this is called, in the schools, a *sophism a dicto secundum quid ad dictum simpliciter*. This sort of sophism has also its reverse; as, when we argue from that which is true, simply and absolutely, to prove the same thing true in all particular circumstances whatsoever.
7. The sophisms of composition and division come next to be mentioned. The sophism of composition is, when we infer any thing concerning ideas in a compound sense, which is only true in a divided sense. The sophism of division is, when we infer the same thing concerning ideas in a divided sense, which is only true in a compounded one. This sort of sophism is committed when the word *all* is taken in a collective and distributive sense, without a due distinction. It is the same fallacy, when the universal word *all*, or *no*, refers to species in one proposition, and to the individuals in another.
8. The last sort of sophisms arises from our abuse of the ambiguity of words, which is the largest and most extensive kind of fallacy; and, indeed, several of the former fallacies might be reduced to this head. When the words or phrases are plainly equivocal, they are called *sophisms*.

phisms of equivocation. This sophism, as well as the foregoing, and all of the like nature, are solved by shewing the different senses of the words, terms, or phrases.

But, where such gross equivocations and ambiguities appear in arguments, there is little danger in imposing on ourselves or others; the greatest danger; and what we are perpetually exposed to, in reasoning, is, where the two senses or significations of one term are near a-kin, and not plainly distinguished; and yet are sufficiently different in their sense to lead us into great mistakes, if we are not watchful. And, indeed, the greatest part of controversies, in the sacred or civil life, arise from the different senses that are put upon words, and the different ideas conveyed by them.

There is, after all these, another sort of sophism, which is wont to be called an imperfect enumeration or a false induction, when, from a few experiments or observations, men infer general theorems and universal propositions.

SOPHIST, a person who uses sophisms, with a view to deceive those he would persuade or convince. See the preceding article.

SOPHISTICATION, the adulterating any thing with what is not good or genuine; a practice too common in the making up medicines for sale; as also among vintners, distillers, and others, who are accused of sophisticating their wines, spirits, oils, &c. by mixing with them cheaper and coarser materials; and, in many cases, the cheat is carried on so artfully as to deceive the best judges. See the articles **WINE**, **SPIRIT**, **OIL**, &c. likewise **HYDROMETER** and **HYDRO-STATICAL BALANCE**.

SOPHORA, in botany, a genus of plants belonging to the decandria monogynia class, with a papilionaceous flower: its fruit is a very long and slender unilocular pod, containing a great many roundish seeds. It agrees in every thing with the diadelphia and papilionaceous plants, except that its stamina is distinct and separate.

SOPORIFIC, or **SOPORIFEROUS**, MEDICINES, are those capable of procuring sleep, as opiates, &c. See **OPIATES**, &c.

SOPOROUS, **SLEEPY** or **DROWSY DISEASES**, are the coma, lethargy, and carus; to which some add the apoplexy. See **COMA**, **LETHARGY**, &c.

SOPRON, a city of lower Hungary, thirty miles south of Vienna.

SORA, a town of the kingdom of Naples, fifty miles north of the city of Naples.

SORAW, a town of Upper Saxony, near the confines of Silesia: east long. $15^{\circ} 20'$, north lat. $51^{\circ} 38'$.

SORBON, or **SORBONNE**, the house or college of the faculty of theology, in the university of Paris; sometimes also used for the faculty itself, because it usually assembles in the house of the sorbon.

SORBUS, the **SERVICE** and **QUICKEN-TREE**, in botany, a genus of the icosa-dria-monogynia class of plants, the flower of which consists of five hollow and roundish petals; and its fruit is a soft, globose, and umbilicated berry, containing three oblong and cartilaginous seeds.

SORCERY, the crime of witch-craft, or divination by the assistance of evil spirits. See the article **WITCH-CRAFT**.

SORET, a province of the hither India, lying northwards of Guzerat: its chief town is Jaganat.

SOREX, the **SHREW-MOUSE**, in zoology. See the article **SHREW-MOUSE**.

SORITES, in logic, a species of reasoning, in which a great number of propositions are so linked together, that the predicate of the one becomes continually the subject of the next following, till at last a conclusion is formed by bringing together the subject of the first proposition and the predicate of the last: such is the following argument, 'God is omnipotent; an omnipotent being can do every thing possible; a being that can do every thing possible, can do whatever involves not a contradiction; therefore, God can do whatever involves not a contradiction.'

This combination of propositions may be continued to any length we please, without in the least weakening the ground upon which the conclusion rests; and the reason is, because the sorites may be resolved into as many simple syllogisms as there are middle terms in it; and the conclusion of the last syllogism is universally found to be the same with the conclusion of the sorites. See **SYLLOGISM**.

SORRANCE, among farriers, a malady incident to horses; of which there are two kinds: 1. An evil counted twofold, as either an evil state or composition of a horse's body; which is to be observed either by the shape, number, quantity, or sight of the member ill affected or diseased.

diseased. 2. It is used for the loosening and division of an unity, which as it may change diversely, so it has divers names accordingly; for if such a loosening and division be in a bone, then it is called a fracture; if in any fleshy part, a wound or ulcer; if in the veins, a rupture; if in the sinews, a convulsion or cramp; and if in the skin, an excoriation.

Sorrance-water is a solution of roman-vitriol and some other ingredients, in vinegar: it is much esteemed as a remedy in many of the diseases of horses, but especially the sorrance: whence the name.

SORREL, or **COMMON SORREL**, *acetosa*, in botany, a species of rumex. See the article **RUMEX**.

The seeds of this plant are esteemed astringent and good in diarrhœas, dysenteries, and hæmorrhages.

Wood-SORREL, *oxalis, oxys, or oxyoides*, in botany, a genus of the decandriapentagynia class of plants; the corolla of which is divided into five parts, which cohere only by their ungues, and are erect, obtuse, and emarginated: the fruit is a pentagonal capsule, containing five cells, with roundish seeds.

The leaves of wood-sorrel are of a very agreeable acid taste, and are recommended in fevers of all kinds, and the scurvy: there is a conserve of them kept in the shops, as a refrigerant.

SORREL COLOUR, in the manege, is a reddish colour, generally thought to be a sign of a good horse.

SORRENTO, a city and port-town of the kingdom of Naples, eighteen miles south of that city.

SORTILEGE, *fortilegium*, a species of divination, performed by means of sortes or lots.

The sortes prenestinæ, famous in antiquity, consisted in putting a number of letters, or even whole words, into an urn; and then, after shaking them together, they were thrown on the ground, and whatever sentences could be made out from them constituted the answer of the oracle.

Another kind of sortes consisted in taking some celebrated poet, as Homer or Virgil, and opening the book, whatever presented itself first to the eye made the answer; and hence it got the name of sortes homericæ, and sortes virgilianæ, &c.

The superstitious among the antient christians practised a similar kind of di-

vination, by opening the Old and New Testament; whence it got the name of sortes sanctorum.

SORY, or **RUSMA**, in natural-history, a vitriolic mineral, formed of metalline, sulphureous, and earthen matter; being truly an ore of blue vitriol, or of the vitriol of copper alone, there not appearing to be a grain of any thing approaching to iron in it.

It is found in loose masses of different sizes, and mostly of a blackish colour, though sometimes reddish or bluish. It is found in many parts of Turkey and in Germany, where it is wrought for blue vitriol, which may be separated from it by a very easy process, by powdering the sory, then exposing it to a moist air for three or four days, and lastly boiling it in six times its weight of water: for if this liquor be filtrated and evaporated in the usual manner to a pellicle, and then set in a cool place to shoot, there will be found crystals of pure blue vitriol adhering to the sides of the vessels. See the article **VITRIOL**.

SOPELLO, a town of Piedmont, fifteen miles north-east of Nice.

SOSPIRO, in the italian music, denotes a pause equal to the time of a crotchet.

SOTERIA, in antiquity, sacrifices offered to the gods for delivering a person from danger; as also poetical pieces composed for the same purpose.

SOTOVENTO-ISLANDS are situated on the coast of Terra-Firma; the chief of which are Trinidad, Margareta, Tortuga, &c. They are also called the lesser Antilles.

SOU, or **SOL**, a french coin. See **COIN**.

SOVANA, a town of Tuscany, in Italy, situated on the confines of the pope's territories, 25 miles west of Orvieto.

SOUBISE, a town of Guienne, in France, situated on the river Charente, seventeen miles south of Rochelle.

SOUGH, among miners, denotes a passage dug under ground, to convey off water from mines. See the article **MINE**.

SOVERAIGN, *supremus*, strictly speaking, signifies the Supreme Being, or God. See the article **GOD**.

SOVERAIGN, in matters of government, is applied to the supreme magistrate, or magistrates, of an independent government or state; by reason their authority is only bounded by the laws of God, of nature, and the fundamental laws of the state: such are kings, princes, &c.

SOVERAIGN is also an appellation given to the supreme courts of judicature. See the article **COURT**,

SOUILLAC, a town of Guienne, in France, thirty-two miles north of Cahors: east long. $1^{\circ} 12'$, north lat. 45° .

SOUL, *anima*, in philosophy, a spiritual substance, which animates the bodies of living creatures: it is the principle of life and activity within them. See the articles **ANIMAL**, **LIFE**, **SPIRIT**, &c. Various have been the opinions of philosophers concerning the substance of the human soul. The epicureans thought it a subtle air, composed of their atoms, or primitive corpuscles. The stoics, on the contrary, maintained it was a flame, or portion of heavenly light. And the cartesianists make thinking the essence of the soul. Others again, hold, that man is endowed with three kinds of soul, *viz.* the rational, which is purely spiritual, and infused by the immediate inspiration of God; the irrational or sensitive, which being common to man and brutes, is supposed to be formed of the elements; and lastly, the vegetative soul, or principle of growth and nutrition, as the first is of understanding, and the second of animal life.

Lord Bacon observes, that there are many excellencies in the human soul above those of brutes; and that where so many and such great excellencies are found, a specific difference should always be made. Hence he highly disapproves of the confused and promiscuous manner of philosophers in treating of the functions of the human soul, as if it differed in degree rather than kind from the souls of brutes. However, he allows, that the doctrine concerning the rational soul of man must be deduced from revelation: for as its substance, in its creation, was not formed out of the mass of heaven and earth, but immediately inspired by God; and as the laws of the heavenly bodies, together with those of our earth, make the subject of philosophy, so no knowledge of the substance of the rational soul can be had from philosophy. But he might have said the same of corporeal substances, since, as Mr. Locke justly observes, we have no idea of one more than of the other. See **ESSENCE**. It is only from the primary, or essential, qualities of body, *viz.* extension, solidity, &c. that we form an idea of it; and why may we not frame the complex idea of a soul, or spirit, from the operations of thinking, understanding, willing, &c.

which are experiments in ourselves? The idea of an immaterial substance is as clear as that we have of a material one: for the this notion of immaterial substances may be attended with difficulties, we have no more reason to deny or doubt of its truth than we have to deny or doubt of the existence of the body. See **EXISTENCE**. That the soul is an immaterial substance appears from hence, that its primary operations of willing and thinking have no only no connection with the known properties of body, but seem plainly inconsistent with some of its most essential qualities. For the mind not only discovers no relation between thinking, and the motion and arrangement of parts; but likewise perceives that consciousness, simple act, can never proceed from a compounded substance, capable of being divided into many parts. To illustrate this, let us only suppose a system of matter endowed with thought; then either all the parts of which this system consists must think, which would make it not only a multitude of distinct conscious beings: or its power of thinking must arise from the connection of the parts one with another, their motion and disposition, &c. which, all taken together, contribute to the production of thought. But it is evident that the motion of parts, and the manner of combining them, can produce nothing but an artful structure and various modes of motion. Hence all machines, however artfully their parts are put together, and however complicated their structure, though we conceive innumerable different motions, variously combined, and running one into another with an endless variety, yet never produce anything but figure and motion. If a clock or watch, tells the hour and minute, the day, it is only by the motion of the different hands, pointing successively to the different figures marked on the hour plate for that purpose. We never imagine this to be the effect of thought or intelligence, nor conceive it possible, by any refinement of structure, so to improve the composition as that it shall become capable of knowledge and consciousness, and the reason is plain, that thought being something altogether different from motion and figure, without the least connection between them, it can never be supposed to result from them. See **MATTER**, **MOTION**, and **FIGURE**. This then being evident, that intelligence cannot arise from an union or combination



Fig. 1. SOUND

A.		A.	
B.	A	A	B
C.	B		
D.	C	A	B
E.	D	B	C
F.	E	C	D
G.	F	D	E
H.	G	E	F
I.	H	F	G
K.	I	G	H
L.	K		
M.	L	H.	
N.	M	I.	I
O.	N	K.	
P.	O	L.	K
Q.	P	M.	L
R.	Q	N.	M
S.	R	O	N
T.	S	P	O
V.	T	Q	P
W.	V	R	Q
	W	S	R
	X	T	S
	Y	V	T
		W	V
		X	W
		Y	X

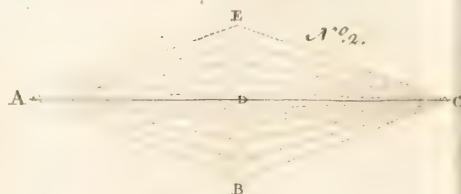
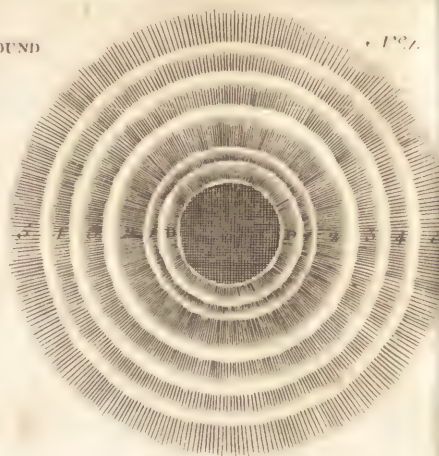
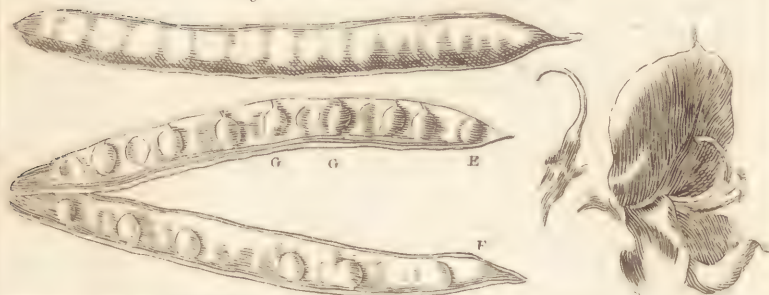


Fig. 2. SPARTIUM, SPANISH BROOM



bination of unintelligent parts; if we suppose it to belong to any system of matter, we must necessarily attribute it to all the parts of which that system is composed; whereby, instead of one, we shall, as was before observed, have a multitude of distinct conscious beings. And because matter, how far soever we pursue the minuteness of its parts, is still capable of repeated divisions, even to infinity; it is plain, that this absurdity will follow us through all the suppositions that make thought inherent in a material substance. Wherefore, as consciousness is incompatible with the cohesion of solid separable parts, we are necessarily led to place it in some other substance, of distinct nature and properties; and this substance we call spirit, which is altogether distinct from body, nay, and commonly placed in opposition to it; for which reason the beings of this class are called immaterial; a word that implies nothing of their true nature, but merely denotes its contrariety to that of matter. See SPIRIT.

As to the immortality of the human soul, the arguments to prove it may be reduced to the following heads: 1. The nature of the soul itself, its desires, sense of moral good and evil, gradual increase in knowledge and perfection, &c. 2. The moral attributes of God.

Under the former of these heads it is urged, that the soul, being an immaterial intelligent substance, as has been already proved, does not depend on the body for its existence; and therefore may, nay, and must, exist after the dissolution of the body, unless annihilated by the same power which gave it a being at first; which is not to be supposed, as there are no instances of annihilation in nature. This argument, especially if the infinite capacity of the soul, its strong desire after immortality, its rational activity and advancement towards perfection, be likewise considered, will appear perfectly conclusive to men of a philosophical turn; because nature, or rather the God of nature, does nothing in vain.

But arguments drawn from the latter head, viz. the moral attributes of the Deity, are not only better adapted to convince men unacquainted with abstract reasoning, but equally certain and conclusive with the former: for as the justice of God can never suffer the wicked to escape unpunished, nor the good to remain always unrewarded; therefore, ar-

guments drawn from the manifest and constant prosperity of the wicked, and the frequent unhappiness of good men in this life, must convince every thinking person, that there is a future state wherein all will be set right, and God's attributes of wisdom, justice, and goodness fully vindicated. We shall only add, that had the virtuous and conscientious part of mankind no hopes of a future state, they would be of all men most miserable: but as this is absolutely inconsistent with the moral character of the Deity, the certainty of such a state is clear to a demonstration.

SOUND, *sonus*, a simple perception, or idea, communicated to the soul, by means of the ear, which is the primary organ of hearing. See EAR.

Sound is caused by an undulatory, or wave-like, motion of the air, arising from the tremulous motion of the parts of any sonorous body when struck upon; for those undulations, or pulses, of the air, beating on the tympanum or drum of the ear, convey by the auditory nerves the sensation of sound to the mind. See the article HEARING.

For that sound has a necessary dependence on the air, is proved by the experiment of the bell in an exhausted receiver; and the parts of a sonorous body being put into motion by percussion, excite concentric vibrations in the air all around the said body; so that let a person be any how, or any where, situated within the verge of those motions, and he will equally hear the sound, at equal distances from the body whence it comes. See plate CCLVI. fig. 1. n° 1. where DD represents a drum, and D 1, 2, 3, 4, 5, &c. the circular pulses of the air, made by, and conveying the sound of, the beats to our ears. For the particles of air contiguous to the sonorous body, being compelled by the first impulse to move forwards, propel those next to them, and these, others again, and so on, to a considerable distance, according to the intensity of the percussive force. But when the particles of the sonorous body make the second part of the vibration, by returning back again, the particles of air also, by their repulsive power, repel each other towards their proper places, and thus again expand themselves. Now since motion, once generated in elastic bodies, continues some time before it can be destroyed by the resistance and counter-action of contiguous bodies,

bodies, it follows, that the particles of the sonorous body, and consequently those of the adjacent air, have for some time a reciprocal vibratory motion, by going forwards and backwards through very small spaces in indefinitely small portions of time; which motion gradually decreases till it be totally destroyed. To illustrate this, let AC (*ibid.* n^o 2.) be an elastic string or chord, fixed at the points A and C; and let it be drawn out of its natural position AC, into another ABC, upon which, being let go, it will, by its elasticity, not only fly back to its first position AC, but into another AEC, near as far on the other side AC, as ABC was on the first: after this it will return again almost to B, and then return almost to E; and these courses and recourses of the string growing still lesser and lesser, it will at last settle in its first and natural position ADC.

When the chord begins its motion at first from B, it strikes the particle of air contiguous to it; and that will, by its approach towards the next particle, affect it, by means of its repulsive power, which keeps all the particles at equal distances from each other; and so on, through such a number of particles as can receive the motion while the string moves from B to D. Let, therefore, A, B, C, D, E, F, G, &c. (*ibid.* n^o 4.) represent such a series of particles of air, at an equal distance, and the first particle A contiguous to the middle point B of such a string, and agitated by it in its motion. The string beginning to move, all the particles A, B, C, will begin to move forwards also; and, since this motion is propagated in time, let E be the remotest particle moved, while the chord is moving from B to D; during which time the chord, having an accelerated motion, will cause the particles to approach each other with an accelerated motion likewise; and because those accelerated approaches begin at A, and reach to E, in the time the chord is going from B to D, therefore the distance AB will be less in BC, and this less than CD, and that less than DE, and the distance EF will begin to be lessened, when the string is arrived at the site ADC, and the particles A, B, C, D, E, F, &c. will have the arrangement represented in the second line. But now the chord, having acquired the situation ADC, will be no farther accelerated, but on the contrary

retarded, as it will now go on from D to E; the effect of which, upon the particles of air before it will be as follows: they will all go on forwards till the chord comes to E, and the particle A to its situation in the third line; but since the force upon A begins to abate, as the string begins to move from D, the elastic force now between A and B will, by acting both ways, continue to accelerate the motion of B, and retard that of A. Thus the distance BC will still diminish, till B comes to lie equi-distant between A and C; and C will be accelerated till it be equi-distant between B and D, and so on. So that, as the acceleration is continued forwards, the distances will diminish towards F; and, by the time the chord is arrived at E, the particles EE will be at their nearest distance. And, since the motion of A is continually retarded, it will lose what before it had gained in the same time, and will therefore now be at the same distance from B, as at first nearly. So that the particle from A to G will have the situations as represented in the third line.

The chord now returning from E to D, gives liberty to the repulsive power between A and B to separate them to a greater distance than in their natural state, and which they at present have. By this means all the other intervals, BC, CD, DE, EF, will increase, and become successively greater than the natural distance; but that excess will be lesser in each, till you come to FG, which will be equal to the natural distance at present between A and B. The motion at the same time continuing in all the particles from H to N, they will all move forwards, and the present contracted interval between H and I will succeed between all the rest, till it arrives at the particle N, when the interval MN will be the same as at present is HI. And those particles beyond N to S will, by the preceding ones, be put into the same respective distances, but in an inverse order, as those have between G and N. And the whole series, now the string is at D, will have the intervals of the particles resembling those in the fourth line.

The chord not stopping at the situation ADC, but going on to ABC, with a retarded motion, the velocity of the contiguous particle A will also be retarded, and becomes less than that of B; upon which, the distance between them will be lessened, and the more so, as the string ap-

approaches to B. Hence all the intervals, now dilated beyond their natural state, will, by degrees, contract; but gradually slower, till you come to F, where the present largest interval between A and B will be found between F and G, and that between A and B will have acquired its natural extent, when the chord is arrived at B. Then, likewise, the particles from G to N will acquire the same situation as those now have between A and G; and from N to S, the same as now is seen between G and N; and from S forwards the same as is now before the particle N, the point S being now the middle point of condensation; all which is clearly seen in the fifth line of the figure. Thus the condensation which begins at A, by the first part of the vibration, was propagated to G by the second, from thence to N by the third, and, lastly, to S by the fourth part of the whole motion of the string, in going and returning; and this extent of air, thus agitated by the chord in going and returning, is called by Sir Isaac Newton a wave, or pulse of air. In which wave the particles from A to N are in a dilated state, and from N to X in a contracted or condensed state; which two parts of the wave answer to the concave and convex, or low and high part of a watery wave.

As the chord goes on to make another vibration, it will not only continue to agitate the air, at present in motion, but will spread the pulsation of the air as much farther, and by the same degrees as before; and the like will happen after a very complete vibration of the string. Thus the air being a fluid body, and the impression made on any one part affecting all the particles alike around it, it is plain those pulses will be propagated in every direction all around in concentric aerial shells, or spherical waves of air.

That the motion of the pulses in an elastic medium is analogous to that of waves generated in the surface of stagnant water, is evident, when we consider that the condensation of the parts of the elastic medium is in lieu of the elevation of the water; the elastic force effects the same in the medium, as gravity does in the water, and the densest part of the pulses corresponds to the highest part of the waves. Thus, let ABC (*ibid.* n° 3.) represent the sonorous body; by the tremulous motion of its parts, it will agitate the air contiguous to every point

as A, where it will be condensed to a certain small distance, and make a pulse or wave of air, in the manner as has been already shewn. The first wave or pulse will, by its elastic power in expanding itself, produce a second, that a third, and so on; till the impressed motion be diffused through too large a quantity of air, to be any longer sensible.

The quantity of motion, produced by each tremor of the sonorous body, being communicated successively to large portions of air, the part thereof, which each particle will acquire, will constantly decrease. This decrement of the motion will be as the increment of the number of particles, which is as the superficies of the spherical shell; and since all superficieses are as the squares of their diameters, or semi-diameters, therefore the force in the particles of the wave or shell at D is to that in the particles of the shell at F, as AF^2 to AD^2 , that is, the force of sound decreases as the squares of the distances increase.

It is plain the distance to which sounds may be heard, will be proportional to the magnitude, or intensity, of the stroke made on the tremulous body emitting the sound; for, the greater that stroke is, the greater will be the agitation of the parts of the sonorous body, and, of course, the greater will be the force with which they will strike the particles of air. Lastly, the greater the force is upon the air, the more closely will it be condensed and expanded; hence the greater will be the stroke at any given distance on the drum of the ear, and, consequently, the greater will be the distance at which the agitation of the air will be sensible.

The experiments are numerous by which it has been found, that sound is audible to the distance of fifty, sixty, or eighty miles: but Dr. Hearn, physician to the king of Sweden, tells us, that at the bombardment at Holmia, A. D. 1658, the sound was heard to the distance of thirty swedish miles, which make 180 ours. And in the fight between England and Holland, A. D. 1672, the noise of the guns was heard even in Wales, which cannot be less than 200 miles.

But since the atmosphere consists not of pure air, but has an admixture of vapours of a different elasticity and tone; these vapours will not participate of the motion of pure air, by which sound is propagated; in like manner as an elastic string, if struck, will not move another

very

very near it, unless it be under the same degree of tension, and of the same tone. Therefore the quantity of air producing sound must be diminished in proportion to the quantity of vapour, in a given space; in which Sir Isaac supposes the air is to the vapour as 10 to 1. Whence the air and vapour together in a given space is to the pure air as 11 to 10.

But the velocity of the pulses will increase in the subduplicate ratio of the diminished quantity of matter, that is, in the subduplicate ratio of 11 to 10, or in the entire ratio of 21 to 20, (as he has shewn, Princip. Prop. 48. lib. II.) Therefore, if we say, as 20 : 21 :: 1088 : 1142; whence the real velocity of sound (thus investigated from the nature of elastic air by our great author) is at length found to be at the rate of 1142 feet per second.

The truth and accuracy of this noble theory have been sufficiently confirmed by experiments, particularly those made by the late Rev. Dr. Derham, of which we shall give some account by and by; but will first lay before the reader a view of the different estimates made of the velocity of sound by several eminent philosophers, as in the table following.

Feet per second.

The honourable Mr. Roberts	1300
The honourable Mr. Boyle	1200
Mr. Walker	1338
Mersennus	1474

At Hornchurch,	—	9	—	0.9875	—
North Okeaden church	18½	—	2,004	—	2,000
Upminster-mill,	—	22½	}	2,4	}
		23			
Little Warley church	—	27½	—	3,0	— 2,97
Rainham church,	—	33¼	—	3,58	— 3,59
Alvel-mill,	—	33	—	3,58	— 3,57
Dagenham-mill,	—	35	—	3,85	— 3,78
Southweal church,	—	45	—	4,59	— 4,86
East Thornden church,	—	46½	—	5,09	— 5,03
Barking church,	—	70½	—	7,7	— 7,62
Guns at Blackheath	116	—	12,5	—	12,55

The great exactness of measuring distances by sounds appears from the above table, as well as the equability of the motion; but to render this matter still more certain and indisputable, the Doctor took a journey to Foulness sands, on the coast of Essex, which form a smooth large plain for miles. On this plain he measured six miles in a right line, and, causing a gun to be fired at the end of each mile, he found that his former observations were very just and true, and that sound passed the first mile in 9¼ half seconds, two

Feet per second.

The academy at Florence	1148
Royal academy at Paris	1172
Sir Isaac Newton, Flamsteed } Halley, and Derham }	1142

As no man ever had a better opportunity; so none could improve it with greater diligence, assiduity, and accuracy, in determining and settling the various phenomena of sounds, than the so often celebrated philosopher last mentioned. He proved by experiments made with the strokes of a hammer, and the explosion of a gun at the same time, at the distance of a mile, that the velocity of sounds produced from different bodies was the same, or came to his ear in the same time.

That the motion of sound was equable and uniform, or that it passed through spaces proportional to the times, he found by various experiments made by the explosion of guns, at different distances; as appears by the following table which he has given us, where the first column shews the places at which the guns were fired; the second, the number of vibrations of an half-second pendulum; the third, the distance of places in miles and decimal parts, as measured by trigonometry; the fourth, the distances measured by the velocity of sound, admitting it to be at the rate of one mile every 9¼ half-seconds.

miles in 18½, three miles in 27¼, and so on to the end of the six.

The Academia del Cimento made experiments of this sort, from which they concluded, that the velocity of sounds was so far equable, as not to be accelerated or retarded by conspiring or adverse winds; but in this they led themselves and many others into a very great mistake, which was owing to their firing of guns at too near a distance; for in great distances the difference is sensible.

SOUND, in music. The principal affection of

of sound, whereby it becomes fitted to produce harmony, and raise agreeable sensations, is that whereby it is distinguished into acute and grave; the cause of which appears to be no other than the different velocity of the vibrations of the sounding body. See the articles HARMONY, TUNE, &c.

SOUND, in geography, denotes in general any stright, or inlet, of the sea, between two head-lands. However, the name sound is given, by way of eminence, to the stright between Sweden and Denmark, joining the german Ocean to the Baltic, being about four miles over.

SOUND-BOARD, in an organ, is a reservoir into which the wind, drawn in by the bellows, is conducted by a port-vent, and hence distributed into the pipes placed over holes in its upper part: this wind enters them by valves, which open by pressing upon the stops or keys; after drawing the registers, which prevent the air from entering any of the pipes, except those it is required in.

SOUNDING, in navigation, is the trying the depth of the water, and the quality of the bottom, either by an inch or three-quarter rope, with a deep sea-lead at the end of it. The sounding line or rope, is marked at two, three and four fathoms, with a piece of black leather betwixt the strands; and, at five fathoms, with a piece of white leather, or cloth. The plummet, or lead, is usually in the form of a nine-pin, and weighs eighteen pounds; and its lower end is frequently greased, to know whether the bottom is sandy, rocky, &c. Near banks, shores, &c. they sound continually.

SOUP, or **SOOP**, a kind of pottage made of bread and broth, or the juice of flesh, or some other matters, usually served at the beginning of a meal.

Soup is esteemed essential to a french dinner, sometimes they heighten the relish by the addition of onions, or leeks, or cabbage, &c.

SOURCE. See the article SPRING.

SOURIS, in the manege, is a cartilage in the nostrils of a horse, by means of which he snorts.

SOUTH, in cosmography, one of the four cardinal points. See the article COMPASS.

SOUTHAM, a market-town of Warwickshire, situated seven miles south east of Warwick.

SOUTHAMPTON, a borough and port-town of Hampshire, situated on a bay of the english channel, twelve miles south-
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west of Winchester. It sends two members to parliament.

SOUTHERN-WOOD, *abrotanum*, in botany, a species of artemisia. See the articles ABROTANUM and ARTEMISIA. Southern-wood is an attenuant, and is serviceable in all obstructions of the viscera, and in destroying worms. It is recommended in suppressions of urine, a dram of it in powder for a dose; and a decoction of it is in repute with some as a lotion for the recovering hair upon the head when fallen off; others recommend its juice as a great cleanser and healer of old ulcers.

SOUTHMOULTON, a market-town of Devonshire, situated twenty-four miles north-west of EXETER.

SOUTHPETHERTON, a market-town of Somersetshire, situated twenty-two miles south of Wells.

SOUTHWARK, a borough of Surry, and a suburb to London, with which it has a communication by a magnificent bridge. It is situated on the south side of the Thames, and sends two members to parliament.

SOUTHWELL, a market-town of Nottinghamshire, situated eight miles north-east of Nottingham.

SOUTHWOULD, a port-town of Suffolk, situated on a bay of the german Sea, forty-two miles east of Bury.

SOUVIGNY, a town of France, in the province of Lyonois, and territory of Bourbonois, situated fifty miles south-east of Bourges.

SOW, in zoology, the female of the hog-kind. See the article HOG.

Sow, in the iron-works, the name of the block* or lump of metal they work at once in the iron-furnace. The size of these sows of iron is very different, even from the same workmen, and the same furnace. These furnaces having sand-stones for their hearths and sides up to the height of a yard, and the rest being made of brick, the hearth by the force of the fire is continually growing wider, so that if it at first contains as much metal as will make a sow of six or seven hundred weight, it will at last contain as much as will make a sow of two thousand weight.

SOWING, in husbandry, &c. See the articles SEED, SEMINATION, &c.

One great article in sowing to advantage, Mr. Tull observes, is to know exactly at what depth the seed may be laid without danger of burying it. Seed is said to be buried, when it is laid at a depth
below

below what it is able to come up at. Different sorts of seeds come up at different depths, some six inches and more, and others will not bear to be buried at more than half an inch. For coming at an accurate knowledge of the depth at which every seed will come up best from the sowing, Mr. Tull proposes to make gages; for the method of conducting which we refer the reader to his own account of it, in page 58, of his *Horse-hoeing husbandry*.

However, it is to be observed, that it is not proper to sow the seeds of all plants at the greatest depths at which they will come up; for it may be so deep as that the wet may rot or chill the first root, as is the case with wheat in moist land. The nature of the land, and the manner how it is laid, either flat or in ridges, and the season of sowing, with the experience of the husbandman, must determine the proper depths for different sorts of seed.

The quantity of seed is to be different also, according to the manner of the sowing. The proper quantity to be drilled on an acre is much less than must be sown in the common way, not because hoeing will not maintain as many plants as the other, for on the contrary, it will maintain many more; but the difference is upon many other accounts, as that it is impossible to sow it so even by hand as the drill will do. For let the hand spread it never so exactly, which yet is difficult enough to do with some seeds in windy weather, yet the unevenness of the ground will alter the situation of the seeds, the greatest part of them rebounding into holes, and the lowest places; or else the harrows, in covering, drawing them down thither; so that these low places may have ten times too much seed, and the high places may have little or none of it; and this inequality lessens in effect the quantity of the seed, because fifty seeds in room of one will not produce so much as one will do, and where they are too thick, they cannot be well nourished, their roots not spreading to near their natural extent, for want of hoeing, to open the earth and give them way.

The distances of the rows is one extremely material point in the obtaining a good crop; but as a much larger distance is to be allowed in these than common practice has been used to, it is very

difficult to persuade the farmer to venture a trial at such distances as he may have experience from.

SOWNE, a term used in the exchequer, where estreats that sowne not, are such as the sheriff by his care and diligence cannot levy, wherefore they are not regarded; and the estreats that sowne, are such as he may levy.

SPA, or **SPAW**, a town of Germany, in the circle of Westphalia, and bishopric of Liege, situated seventeen miles south-east of Liege, famous for its mineral waters ever since the time of the Romans, of which there are still great quantities sent abroad to all parts of Europe.

Spaw waters are the lightest and most subtle of all the mineral waters, as is proved by several experiments, and the small quantity of earth, and the large portion of subtle mineral spirit they contain, bespeak their possessing the most exalted virtues of all the other mineral waters. One very remarkable virtue of this water is, that it greatly relieves in all disorders of the kidneys, ureters and bladder, whether occasioned by stone, gravel, or ulcerations. It possesses, beside, all the virtues of the other mineral waters, and is of the greatest service in edulcorating sharp, and dividing viscous, humours, and removing all diseases arising from these causes, by disposing them to pass off by proper excretories. See the article *MINERAL water*.

These waters drank at the spring, cause a sort of drunkenness, which does not last above a quarter of an hour; when carried to any distant place, though ever so well stopped down, they will always, after some time, precipitate a small quantity of a yellow ochreous earth; mixed with milk, they do not coagulate it, but when mixed with wine, make a great ebullition, and throw up a large quantity of air-bubbles, with a peculiarly pleasing smell.

SPACE, *spatium*, is defined by Mr. Locke, to be a simple idea, which we attain both by our sight and touch. The modes whereof are distance, capacity, extension, duration, &c. See the articles *DISTANCE*, *CAPACITY*, &c.

Space considered barely in length, between two bodies, is the same idea which we have of distance. If it be considered in length, breadth, and thickness, it is properly called capacity; when considered between the extremities of matter which fills

fills the capacity of space, with something solid, tangible, and moveable, it is then called extension, so that extension is an idea belonging to a body, but space, it is plain, may be conceived without it. Each different distance is a different modification of space, and each idea of any different space is a simple mode of this idea: such are an inch, foot, yard, &c. which are the ideas of certain stated lengths, which men settle in their minds for the use, and by the custom of measuring. When these ideas are made familiar to mens thoughts, they can repeat them as often as they will, without joining to them the idea of body, and frame to themselves the ideas of feet, yards, or fathoms, beyond the utmost bounds of all bodies, and by adding these still one to another, enlarge their idea of space as much as they please. From this power of repeating any idea of distance without ever coming to an end, we come by the idea of immensity. See the article IMMENSITY.

Another modification of space is taken from the relation of the termination of the parts of extension, or circumscribed space, amongst themselves; and this is what we call figure. This the touch discovers in sensible bodies, whose extremities come within our reach; and the eye takes, both from bodies and colours, whose boundaries are within its view; where observing how the extremities terminate, either in straight lines, which meet at discernible angles; or in crooked ones, wherein no angles can be perceived: by considering these as they relate to one another in all parts of the extremities of any body or space, it has that idea we call figure, which affords to the mind infinite variety. See FIGURE.

Another mode belonging to this head is, that of place. See the article PLACE.

There is another mode of space, the idea of which we get from the fleeting and perpetually perishing parts of succession, which we call duration. See the article DURATION.

Space is usually divided into absolute and relative. Absolute space is that considered in its own nature, without regard to any thing external, which always remains the same, and is infinite and immoveable.

Relative space, is that moveable dimension, or measure of the former, which our senses define by its positions to

bodies within it, and this is the vulgar use for immoveable space.

Relative space in magnitude and figure, is always the same with absolute; but it is not necessary it should be so numerically; as if you suppose a ship to be, indeed, in absolute rest, then the places of all things within her will be the same, absolutely and relatively, and nothing will change its place: but suppose the ship under sail or in motion, and she will continually pass through new parts of absolute space; but all things on board, considered relatively in respect to the ship, may be, notwithstanding, in the same places, or have the same situation and position in regard to one another.

Proper and absolute motion is defined to be the application of a body to different parts of absolute, that is, infinite and immoveable space. The cartesian, who maintain extension the essence of matter, assert, that the space any body takes up is the same thing with the body itself; and that there is no such thing as mere space void of all matter in the universe. See CARTESIAN and VACUUM.

SPACE, in geometry, denotes the area of any figure, or that which fills the interval or distance between the lines that terminate it.

SPACE, in mechanics, the line a moveable body, considered as a point, is conceived to describe by its motion.

SPADE, an instrument for digging up the ground, the handle or shaft whereof is about three feet long; the head is all of iron; the upper part being flat for the workman to set his foot on, to force it into the ground; the length of the head is about a foot or fifteen inches, and the breadth six or eight.

SPAGIRIC ART, *ars spagirica*, a name given by authors to that species of chemistry which works on the metals, and is employed in the search of the philosopher's stone.

SPAHIS, horsemen in the ottoman army, chiefly raised in Asia. The great strength of the grand seignior's army consists in the janizaries, who are the foot, and the spahis, who are the horse.

SPAIN, including Portugal, is a large peninsula of Europe, lying between 10° west and 3° east longitude, and between 36° and 44° north latitude, being about seven hundred miles in length from east to west, and about five hundred in breadth from north to south; it is bounded by

the bay of Biscay, on the north ; by the Pyrenean mountains, which separate it from France, on the north-east ; by the Mediterranean-sea, on the south-east ; and by the Atlantic-ocean, on the west. See the article PORTUGAL.

The kingdom of Spain, considered separately from Portugal, comprehends fourteen provinces, each of which may be seen under its proper name.

NEW SPAIN. See the article MEXICO.

SPALATRO, a city and port-town of Dalmatia, situated on the gulph of Venice : east. long. $17^{\circ} 45'$, north latitude $43^{\circ} 16'$.

SPALDING, a market-town of Lincolnshire, situated under the meridian of London, thirty miles south-east of Lincoln.

SPAN, a measure taken from the space between the thumb's end and the tip of the little finger, when both are stretched out. The span is estimated at three hand's breadths, or nine inches. See MEASURE.

SPANDAW, a town of Germany, in the circle of Upper Saxony, and marquisate of Brandenburg, situated on the river Havel, eight miles north-west of Berlin.

SPANIEL, in zoology, a species of the canis or dog kind. See CANIS.

There are two sorts of spaniels which necessarily serve for fowling : the first of these finds game on land, and the other on the water. Such spaniels as play their parts by land, do it either by swiftness of foot, by springing the bird, or by discovering to the fowler, by some secret sign, the place where the game lights ; they serve the hawk and the net, or train. See the article SETTING.

The water-spaniel, partly by natural inclination, and partly by being well trained, has recourse to the water for his game and by this means most of the water-fowl are taken. The size of this spaniel is somewhat larger than the other, but he is generally remarkable for long rough curling hair, which must be clipped at proper times, to render him more light for swimming.

SPAR, in natural history, a class of fossils, not inflammable nor soluble in water ; when pure, pellucid and colourless, and emulating the appearance of crystal, but wanting its distinguishing characters ; composed of plane and equable plates, not flexible nor elastic ; not giving fire with steel ; readily calcining in a small fire, and fermenting violently with acids, and wholly soluble in them. See the article CRYSTAL.

The spars, in general, are found in the

fissures of stones, and about mines. Derbyshire affords enough of them to supply the whole world ; and the german mines afford yet larger quantities.

If crystal be subject to a vast variety of appearances, so as to constitute different orders and genera, spar is much more so, there being no less than ten orders of it.

1. The pellucid, crystalliform and perfect spars, composed of a column terminated at each end by a pyramid.
2. Those composed of two pyramids joined hafe to base, without any intermediate column.
3. The crystalliform columnar spars, adhering by one end to some solid body, and terminated at the other by a pyramid.
4. The pyramidal crystalliform spars without columns.
5. The spars of a paralleloiped form. The spars externally of no regular form, but breaking into rhomboidal masses.
7. The crustaceous spars ; these are of a crystallino-terrene structure, or debased from their native pellucidity by an admixture of earth, and formed into plates or crusts of a striated figure within.
8. The crustaceous terrene spars ; bodies so highly debased with earth, as to appear merely earthy, of an irregular structure, and not striated within ; these often encrust fissures of stone and sometimes vegetable and other extraneous bodies in springs.
9. The spars formed into oblong cylindric bodies, known by the name of stalactitæ, or stony icicles.
10. The spars formed into small round figures, composed of various crusts enclosing one another, and generally known by the name stalagmitæ : and adding to these the spars, influenced in their figures by metalline particles, we have the whole series of these bodies, viz. 1. The cubic spars, owing their figure to lead. 2. The pyramidal spars, with four planes, owing their figure to tin. 3. The rhomboidal spars, consisting of six planes, owing their figure to iron.

For medicinal use, the purest and most pellucid spars should be chosen : these perfectly dissolve in acids, and are recommended in nephritic cases. Some have used one kind, some another, as the lapis judæicus, the sparry incrustations of caverns, petrified oyster shells, and water in which large quantities of spar are sustained. After all, the nephritic virtues of spar want sufficient proof : some even suspect its use to be more hurtful than beneficial.

It were to be wished, that whoever attempts to ascertain this point, would choose

choose for the experiment some determinate kind of spar in its natural form, rather than under appearances, whereby its efficacy may be confounded with that of other bodies.

SPARADRAP, *sparadrapum*, in pharmacy, &c. a sort of cere-cloth, called also tela Gualteri, the form whereof is directed as follows. Take of the diapalma plaister, and diachylon with the gums, each one pound; cerufs, half a pound; root of orris finely powdered, an ounce and a half. Mix these together, and whilst they are in fusion, dip them in soft worn-out linen rags, so that they may be covered with the plaister on each side; then take them out, spread them, and let them dry; and smooth the surfaces with a knife or spatula. The principal use of these is for issues.

SPARAGUS, or **ASPARAGUS**, in botany. See the article **ASPARAGUS**.

SPARGANIUM, **COMMON BUR-REED**, in botany, a genus of the monoecia triandria class of plants, having no corolla; the male and female flowers have a roundish amentum; the calyx of the male is formed of two leaves, and that of the female of three; the fruit is a dry drupe, turbinate with a point, and angulated underneath; the seeds are two osseous, oblongo-ovated and angulated nuts.

The root of this plant is recommended by Dioscorides as excellent against the poison of serpents, when taken in wine.

SPARRING, among cock-fighters, is the fighting a cock with another to breathe him. In sparring they put hotts on their spurs that they may not hurt one another. See the article **HOTTS**.

To spar the cock in general, signifies to breathe him, in order to embolden him to fight.

SPARROW, *passer*, in ornithology, a species of the fringilla. See **FRINGILLA**.

The common sparrow is the brown fringilla, with a black throat and brown temples. It is larger than the linner, and the male is an erect and handsome bird; the head is large, the eyes small, and the beak short; the wings are short, and the tail short and forked.

The reed sparrow, or the fringilla with a black head brown at the sides, and with a white ring round the neck, and a mottled black and white breast, is a very beautiful and singular bird, of the size of the common linnet; the head is small and depressed, the beak short and black, and the eyes hazel; and in most other par-

ticulars it corresponds with the common sparrow. See plate CCLVI. fig. 4. where n^o 1. represents the cock, and n^o 2. the hen.

SPARROW-HAWK, in ornithology, the yellow-legged falco with a white undulated breast, and a fasciated brown tail. See the articles **FALCO** and **HAWK**.

This bird is about the bigness of a pigeon, but considerably longer bodied, in proportion to its thickness; its wings, when expanded, measure twice the length of the body and tail; the tail is short but very strong, thick at the base, very sharp at the point, and considerably hooked; the head is small, somewhat flattened, and of a brownish colour; the eyes are as it were sunk in the head, and their iris is yellow and bright.

SPARSE LEAVES, among botanists, leaves which are placed irregularly over the several parts of the plant.

SPARTEL CAPE, a promontory of the coast of Barbary, at the entrance of the straits of Gibraltar.

SPARTIUM, **SPANISH-BROOM**, in botany, a genus of the diadelphia-decandria class of plants, the corolla whereof is papilionaceous, and the fruit is a long, cylindric, obtuse pod of two valves: the seeds are numerous, globose, and kidney-shaped. See plate CCLVII. fig. 2.

SPARTIUM is also Tournefort's name for the genista of Linnæus, as genista is Linnæus's name for Tournefort's spartium. See the article **GENISTA**.

SPARTIVENTO CAPE, the most southern point or promontory of Italy, situated in east long. 16° 30', north lat. 38° 20'.

SPARUS, in ichthyology, the name of a genus of fish of the order of the acanthopterygii, the characters of which are, that the coverings of the gills are scaly, with lips covering the teeth in the same manner as in quadrupeds; the teeth themselves are either like those of the human head, or like those of a dog; the molars are like those of quadrupeds; the teeth stand only in the jaws and fauces; the palate and the tongue are smooth; there is only one back-fin; the tail is forked, and the eyes covered with a lax skin.

SPASM, *spasma*, or *spasmus*, in medicine, a convulsion.

A spasm, according to Hoffman, may be universal or particular, salutary or morbid. An universal spasm happens if the whole vascular genus, chiefly the heart and arteries, as also the fibres of the

the system, are affected, and there is a preternatural constriction therein, whereby the systole and diastole are increased, and the progress of the blood accelerated; this constitutes a fever, whereof a frequent pulse is the most certain sign. The other kind of spasms is particular, and affects only one part of the body, which it constricts, and intercepts the free progress of the blood, rendering it unequal, and sending it in greater plenty to the other parts of the body. But particularly this spastic affection affects the nervous and membranous parts, such as the stomach, and the whole volume of the intestines; whence proceed the hysterical and hypochondriac passions. A spasm is likewise present in hæmorrhages, congestions of the blood, and unequal flux of the fluid in all anxieties and suppressed excretions. See HYPOCHONDRIAC, HYSTERIC, HÆMORRHAGE, &c. If a violent spasm happens to affect the dura mater, an epilepsy or universal convulsion follows; and convulsive motions of the membranes and nerves have their origin from the medulla spinalis. A spasm is salutary when it destroys the cause of the disease, by taking away the stagnation of the humours, correcting acid caustics, and promoting the excretion of the morbid matter; but it is very pernicious when it constricts the skin and all the excretory vessels, detaining the morbid matter therein, and forcing it upon the vital parts. The causes and treatment of spasms in general, have already been treated of under the articles CONVULSION and CONVULSIVE DISORDERS.

In a spasm of the lower jaw, when the patient can neither open his mouth nor eat; as when persons are wounded, and something foreign is lodged therein, or when the nerves are hurt, or when sharp things, such as vitriol, are applied to stop the blood, the cure must be performed according to the diversity of the causes as particularly treated of in surgery; but when this happens spontaneously in infants, it is observed that they generally die, though the best nervous and antispasmodic medicines be used.

In the cynic spasm, or as it is otherwise called, the sardonian laughter, if it proceeds from poisons, as it generally does, especially hemlock or oenanthe, Heister directs that they be expelled immediately from the body by a vomit; then giving generous wines, warm with ginger or

pepper, as was the practice of the ancients. If it happens from other causes, it must be treated with antispasmodic and nervous medicines, both inwardly and outwardly, and chiefly with plaster of betony and bayberries prepared with oil of amber, and applied to the temples, and behind the ears.

For that species of the convulsion called cramp, see the article CRAMP.

SPASMODIC, something belonging to a spasm or convulsion. See the last article.

SPATHA, a word used by different authors in various senses; among botanists it expresses that sort of cup which consists of a simple membrane growing from the stalk; this kind of cup is of various figures, often diphylous, or divided into two parts; often simple; sometimes more divided: it incloses sometimes a single flower; sometimes several flowers together, and these have often no perianthium; the spatha is of very different texture and consistence in different plants. See plate CCLVIII, fig. 1.

Some authors, by this word, express a rib; others, the surgical instrument called spatula; others, a sort of incision-knife, and by others it is taken for a sword, this last being, indeed, its proper signification, and all the rest being only metaphorical applications of it to different things, which bear some resemblance to a sword.

SPATULA, or SPATHULA, an instrument used by surgeons and apothecaries. This instrument is made of different shapes, according to the various uses of it: that marked n^o 1. plate CCLVI, fig. 5. is used to depress the tongue in order to examine the state of the tonsils, uvula and fauces, when they are affected with any disorders: it is also used to suspend the tongue when the frenum is to be divided, for which purpose it has a fissure at its extremity, and should therefore be made of silver rather than any other metal; those marked n^o 2. and 3. *ibid.* are chiefly used in spreading plasters, ointments, and cataplasms, and sometimes with their fulcated extremity they are of service in raising up fractured bones of the cranium.

SPAVIN, in the menage, a disease in horses, being a swelling or stiffness usually in the ham occasioning a lameness. There are two kinds of spavins, *viz.* the ox-spavin, which is a callous tumour at the bottom of the ham on the inside, hard as a bone, and very painful; while it is yet recent,

some only halt with it at the first coming out of the stable: the other, which is the dry spavin, is more easily perceived by the horse's raising one of his hind legs with a twitch higher than the other; but sometimes it is found on both legs. This kind, which some also call string-halt, frequently degenerates into the ox-spavin, for which there is no remedy but to apply the fire, and even this is not always successful.

There are two other kinds of spavin which have their seat in the hoof, *viz.* the blood-spavin, being a soft tumour which grows through the horse's hoof, and is usually full of blood; the other is the bone-spavin, being a crusty substance growing on the inside of the hoof under the joint.

SPAW, or **SPA**. See the article **SPA**.

SPAYING, or **SPADING**, the operation of castrating the females of several kinds of animals, as sows, bitches, &c. to prevent any further conception, and promote their fattening.

It is performed by cutting them in the mid flank, on the left-side, with a sharp knife or lancet, taking out the uterus and cutting it off, and so stitching up the wound, anointing the part with tar, and keeping the animal warm for two or three days. The usual way is to make the incision aslope two inches and a half long, that the fore-finger may be put in towards the back to feel for the ovaries, which are two kernels as big as acorns on both sides of the uterus, one of which is drawn to the wound, the string thereof cut, and thus both taken out.

SPEAKER of the house of commons, a member of the house elected by a majority of the votes thereof, to act as chairman or president in putting questions, reading briefs or bills, keeping order, reprimanding the refractory, adjourning the house, &c. The first thing done by the commons, upon the first meeting of a parliament, is to chuse a speaker, who is to be approved of by the king, and who, upon his admission, begs his majesty that the commons, during their sitting, may have free access to his majesty, freedom of speech in their own house, and security from arrests. The speaker is not allowed to persuade or dissuade in passing a bill, but only to make a short and plain narrative; nor to vote unless the house be equally divided. See **PARLIAMENT**.

The lord chancellor or keeper is usually speaker of the house of lords; the speaker

of the convocation is called the prolocutor. See the article **PROLOCUTOR**.

SPEAKING, the art or act of expressing one's thoughts in articulate sounds or words.

SPEAKING TRUMPET. See **TRUMPET**.

SPEAR, in the menage. The feather of a horse, called the stroke of the spear, is a mark in the neck or near the shoulders of some barbs and some turky and spanish horses, representing the blow or cut of a spear in these places, with some resemblance of a scar; this feather is an infallible sign of a good horse.

SPECIAL, something that is particular, or has a particular designation, from the Latin *species*, in opposition to general from *genus*. See **GENERAL**, &c.

SPECIAL matter in evidence, in law, denotes that which is alledged specially, and does not come into the general issue.

SPECIALTY, is used for a bond, bill, or other deed or instrument executed under the hand and seal of the parties thereto.

SPECIES, in logic, a relative term, expressing an idea which is comprized under some general one, called a genus. See the article **GENUS**.

The idea of a species is formed, by adding a new idea to the genus; thus if the genus be a circumscribed space, and we suppose this circumscription to be by lines, we shall obtain the notion of that species of figures which are called plain figures; but if we conceive the circumscription to be by surfaces, we get an idea of the species of solid figures. This superadded idea is called the specific difference, not only as it serves to distinguish the species from the genus; but because being different in all the several subdivisions, we thereby also distinguish the species one from another: and as this superadded conception completes the notion of the species, it is plain that the genus and specific difference are the proper and constituent parts of the species. If we trace the progress of the mind still farther, and observe it advancing through the inferior species, we shall find its manner of proceeding to be always the same; since every lower species is formed, by superadding some new idea to the species next above: thus if animal be the genus, by superadding the notion of four limbs, we obtain the idea of quadrupeds; if to this we add farther, the peculiar form and characters which distinguish mankind, we get the idea of the human species;

cies; and by adding the peculiarities which distinguish a particular person from all others, we form the notion of an individual, which is called the last species, or species specialissimum.

For the use of the genus, species, and specific difference in defining things, see the article DEFINITION.

SPECIES, in logic, is one of the five words called by Porphyry universals. See the article UNIVERSAL.

SPECIES, in rhetoric, is a particular thing, contained under a more universal one.

SPECIES, in optics, the image painted on the retina, by the rays of light reflected from the several points of the surface of an object. See the article VISION.

SPECIES, in commerce, are the several pieces of gold, silver, copper, &c. which having passed their full preparation and coinage are current in public. See the article COIN.

SPECIES, in algebra, the characters or symbols made use of to represent quantities. See the article CHARACTER.

SPECIES, in pharmacy, denotes the ingredients of a compound medicine, as the diascordium in a dry form, or only reduced powder. See DIASCORDIUM.

The species aromaticæ, according to the Edinburgh-dispensatory, consist of equal parts of canella, lesser cardamom-seeds, mace and ginger, reduced to powder: but the college of physicians, London, order them to be made of cinnamon, two ounces; and lesser cardamom-seeds husked, ginger and long pepper, of each one ounce, all beat together into a powder. Both these compositions are agreeable, hot, spicy medicines; and as such may be usefully exhibited in cold phlegmatic habits and decayed constitutions, for warming the stomach, promoting digestion, and strengthening the tone of the viscera in general. The dose is from ten grains to a scruple and upwards.

Change of SPECIES, in husbandry, is the sowing first one kind of plant, then another, and then a third, and so on, upon the same land: by this means the most is made of the soil; and it is found, when it will no longer give a good crop of the first corn planted on it, that it will still give a good one of some other species; and, finally, of pease after all. After this last change of species, it is found necessary, in the common method of husbandry, to renew the land with fallowing and manure, in order to its producing any thing again.

SPECIFIC, in philosophy, that which is peculiar to any thing, and distinguishes it from all others.

SPECIFIC, in medicine, a remedy whose virtue and effect is peculiarly adapted to some certain disease, is adequate thereto, and exerts its whole force immediately thereon.

The illustrious Hoffman has given a curious account of specific medicines, but it is too long to be inserted here.

SPECIFIC GRAVITY, is that by which one body is heavier than another of the same dimension, and is always as the quantity of matter under that dimension. See the article GRAVITY.

As to the method of finding the specific gravities of bodies, see the articles HYDROMETER and HYDROSTATICAL BALANCE.

SPECILLUM, in surgery, the same with speculum. See SPECULUM.

SPECIOUS ARITHMETIC, the same with algebra. See the article ALGEBRA.

SPECTACLES, in dioptrics, a machine consisting of two lenses, set in silver, horn, &c. to assist the defects of the organ of sight. See LENS.

Old people, and others who have flat eyes, use convex spectacles, which cause the rays of light to converge so as to fall upon the retina: whereas myopes, or short-sighted persons, use concave lenses for spectacles, which causing the rays to diverge, prevent their meeting ere they reach the retina. The convexity or concavity of the glasses, suited to the different degrees of flatness or convexity of people's eyes, is best determined by trial: observing only to use those glasses which are the least convex or concave of any, that will fit the eye: for since they cannot be put quite close to the eye, the less any glass is convex or concave, the less it will magnify or diminish the pictures of objects upon the retina. See the articles VISION and MYOPIA.

Were there no other use of dioptrics than that of spectacles for defective eyes, the advantage that mankind receives thereby is certainly inferior to none other whatsoever, that is not absolutely requisite to the support of life; for as the sight is the most noble of all our senses, surely that instrument that relieves the eyes when decayed, and supplies their defects, rendering them useful when otherwise almost useless, must needs, of all others, be esteemed of the greatest advantage.

The



Fig. 1. SPATHA.



Fig. 2. SPECULUM

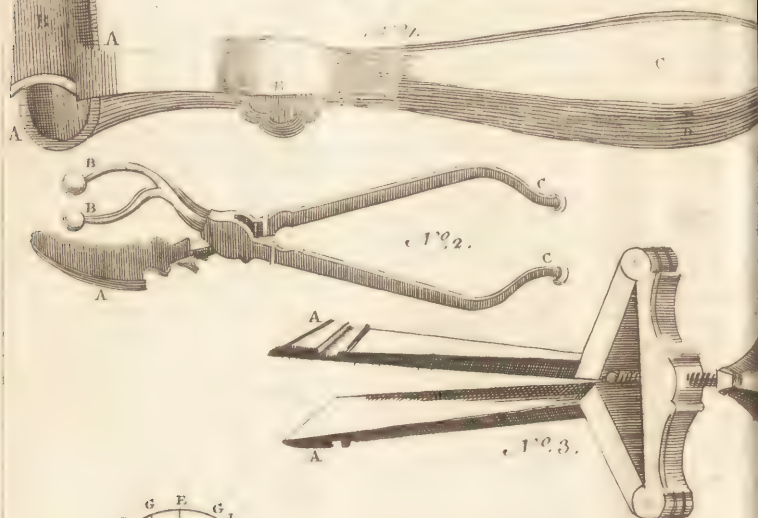
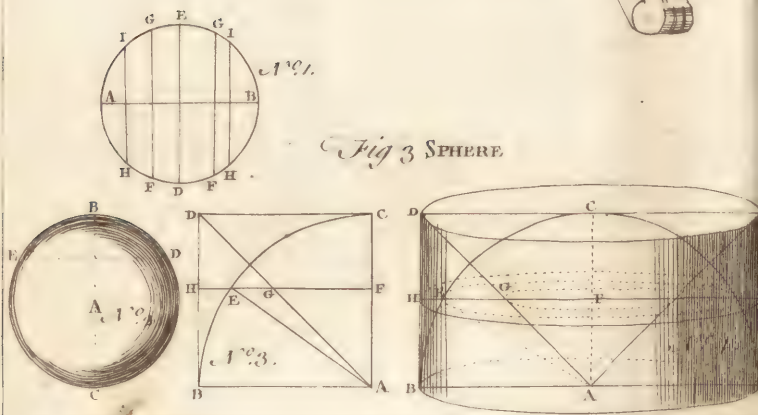


Fig 3 SPHERE.



The antients knew nothing of spectacles, the invention of which is said to have been about the year 1300.

Spectacles without cases, pay, on importation, a duty of 6 s. 7 $\frac{1}{2}$ d. for each gross, containing twelve dozen; and draw back, on exportation 5 s. 2 $\frac{1}{2}$ d.

SPECTRE-SHELL, *concha spectrorum*, a species of voluta, variegated with several reddish fasciæ or bands. See the article **VOLUTA**.

SPECULARIS LAPIS, in natural history, a genus of talcs composed of large plates visibly separate, and of extreme thinness; and each fissile again separated into a number of plates still finer. See **TALC**. Of this genus there are three species: 1. The white shining specularis, with large and broad leaves, commonly called *isnglass* and *muscovy-glass*: its lamellæ, or leaves, are extremely thin, elastic, and transparent; it makes not the least effervescence with aqua fortis, and is not easily calcined in the fire. It is imported in great quantities; the miniature painters cover their pictures with it; the lantern-makers sometimes use it instead of horn; and minute objects are usually preserved between two plates of it, for examination by the microscope. 2. The bright brown specularis, with broad leaves; a very valuable species, though inferior to the former. 3. The purple bright specularis, with broad leaves; which is the most elegant of all the talcs, and not less beautifully transparent than the first kind.

SPECULATIVE, something relating to the theory of some art or science, in contradistinction to practical. See **THEORY**.

SPECULUM, a **LOOKING-GLASS**, or **MIRROR**, capable of reflecting the rays of the sun, &c. See the articles **MIRROR**, **LIGHT**, **REFLECTION**, &c.

SPECULUM, in surgery, an instrument for dilating a wound, or the like, in order to examine it attentively.

These specula are of different figures, according to the parts they are intended to search: 1. The speculum ani (plate CCLVIII. fig. 2. n° 1.) serves to dilate and inspect the anus, vagina, and uterus, in disorders of these parts; it consists of a hollow cone or beak, whose two sides are marked A A and B B, which, being gently warmed and lubricated with oil, are then pressed into the anus or vagina; and by pressing together the two handles C and D, the sides of the cone are thereby gradually separated,

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and dilate the parts for inspection: the hinge E, is in manner of a ginglymus.

2. The speculum oculi, the description and use of which may be seen under the article **COUCHING**. 3. The speculum oris, for inspecting the mouth, is almost like a pair of forceps; A (*ibid.* n° 2.) being the part that depresses the tongue, while the parts B, B, elevate the dentes incisores of the upper jaw, by pressing the handles C, C, together. *Ibid.* n° 3. is another speculum oris, furnished with a screw, to open the teeth in convulsions; A A being the parts interposed between the dentes incisores, and which are opened by means of the screw B.

SPEECH, in general, the art or act of expressing a person's thoughts, by means of articulate sounds, which we call words. See the article **WORD**.

Grammarians generally make eight parts of speech, i. e. eight kinds of words, generally used in discourse, viz. noun, pronoun, participle, adverb, preposition, interjection, and conjunction; each of which see under its proper article.

Others, particularly english grammarians, refer all words to four general heads or classes, viz. 1. Such words as denote things actually existing, or their properties, which are called nouns or names, as *house, tree, man, horse, convenient, large, &c.* 2. Such words as express action or passion, as *I love, I am loved*; and these are called verbs or affirmations.

3. Such words as denote the manner or way of doing or suffering, as *swiftly, slowly, &c.* which are called adverbs.

4. Particles, or such small words as serve to connect others together, in forming a sentence, as *and, or, also, before, after, &c.* See the articles **PARTICLE**, **NOUN**, **VERB**, &c.

SPEEDWELL, *veronica*, in botany. See the article **VERONICA**.

SPELL, in general, denotes the same with charm or amulet. See the articles **CHARM** and **AMULET**.

In the sea-language, the word spell signifies to do any work for a short time, and then leave it; therefore a fresh spell is when fresh men come to work; and to give a spell, is to work in another's room.

SPELLING, in grammar, that part of orthography which teaches the true manner of resolving words into their syllables. See the article **ORTHOGRAPHY**.

All words are either simple or compound,

as *use, disuse; done, undone*: and the rules for dividing each, must be such as are derived from the analogy of language in general, or from the established custom of speaking; which, for the english language, are reduced to the following rules: 1. A consonant between two vowels must be joined with the latter in spelling, as *na-ture, ve-ri-ly, ge-ne-rous*: except, however, the letter *x*, which is joined to the first, as in *flax-en, ox-en, &c.* and compound words, as in *up-on, un-used, &c.* 2. A double consonant must be divided, as in *let-ter, man-ner, &c.* 3. Those consonants which can begin a word, must not be parted in spelling, as in *de-fraud; re-prove, di-stinct*: however, this rule is found sometimes to fail; for tho' *gn* begins a word, as *gnaw, gnat, &c.* yet it must be divided in spelling, as in *cog-ni-zance, ma-lig-ni-ty, &c.* 4. Those consonants which cannot begin a word must be divided, as *ld* in *fel-dom, lt* in *mul-ti-tude, mp* in *tem-per, rd* in *ar-dent*; but, in final syllables, there are exceptions, as *tl* in *ti-tle, dl* in *ban-dle, &c.* 5. When both vowels come together, and are both of them distinctly sounded, they must be separated in spelling, as in *co-e-val, mu-tu-al, &c.* 6. The grammatical terminations, or endings, must be separated in spelling, as *ed* in *wing-ed, edst* in *de-li-ver-edst, ing* in *bear-ing, ance* in *de-li-ver-ance, &c.* 7. Compound words must be resolved into their simple or component words, as *up-on, in-to, never-the-less, not-with-stand-ing, &c.*

SPELTER, in natural history, the same with **zink**. See the article **ZINK**.

SPENT, in the sea-language, signifies the same as broken.

SPERGULA, SPURRY, in botany, a genus of the decandria-pentagynia class of plants, the flower of which consists of five oval, concave, patent petals; and its fruit is an oval, covered, unilocular capsule, formed of five valves, and containing numerous rounded seeds, surrounded with an emarginated rim.

SPERM, σπερμα, the same with seed. See the article **SEED**.

SPERMA-CETI, in pharmacy, a white flaky substance, prepared from the oil of a species of whale, called by ichthyologists catodon, by reason it has teeth only in the under jaw. See **CATODON**.

The ignorance of the people who first used this medicine, gave it a name which seemed to express its being the semen of

the whale; but it is, in reality, no more than a preparation of the oil, with which that fish abounds.

Sperma-ceti is a fine, bright, white, and semi-pellucid substance, composed of a fine surfuraceous substance, formed into oblong flakes, very light, soft, and unctuous to the touch, inflammable, soluble in oil, but not in watery menstrua; of scarce any smell, when fresh and fine, and of a soft, agreeable, and unctuous taste. The largest, firmest, and whitest flakes of it are to be chosen. It is liable to become rancid and yellowish in keeping, and the smaller fragments contract this bad quality sooner than the larger.

The **sperma-ceti** of the shops was first made from the head of this fish; the oil obtained from its brain, and the diploe of the cranium, furnishing all that we had of it; and hence the considerable price it was long kept at. It was some time after found out, however, that any whale-oil would do as well as this, which occasioned the price to fall considerably. At present it is made in England from whale-oil of any kind, the settlings of our oilmen's larger vessels particularly, which are boiled with a lixivium of a german pot-ash, or pearl-ashes, till white and firm; and after several other meltings, and a thorough separation of what saline particles might have got into the matter, it is, when cold, cut out with knives into the flakes we see it in. The process is easy, but it requires care, and a nice inspection towards the end: if not enough boiled, it is apt to turn yellow, and soon grow rancid.

Sperma-ceti is, therefore oil of the animal kind, rendered very sweet, and fit for internal use. Its virtues are emollient and pectoral; it is good in coughs, and other disorders of the breast; and excellent in external applications, such as liniments, and the like: it readily dissolves in oil, or other fatty substances, for the latter purposes; and, for the former, it blends with the yolk of an egg, and after that mixture with an aqueous fluid, and makes a pleasant emulsion.

SPERMACOCE, in botany, a genus of the tetrandria-monogynia class of plants, the corolla whereof consists of a single petal; the tube is cylindric, and longer than the cup; the limb is divided into four parts, patent, reflex, and obtuse; the fruit consists of two oblong capsules, growing together, gibbous on one side, plane on the other, and each of them having

having two horns or points; the seeds are single and roundish.

SPERMATIC, in anatomy, something belonging to the sperm or seed.

The spermatic vessels, called also vasa præparantia, are certain vessels appointed for bringing the blood to the testicles, &c. to be secreted and prepared into seed, and for carrying back again the blood remaining after the secretion is effected. The spermatic vessels are two arteries and as many veins. The spermatic arteries arise, by a very narrow origin, from the fore part of the trunk of the aorta, below the emulgent: their structure is very singular, in that, contrary to the fabric of all other arteries, which are largest at their exit from the trunk, these are smallest at their origin, and grow bigger in their progress towards the testes; by this means the blood receives a check at its first going off for those parts, which disposes it for the future changes, &c. it is to pass thro'. The same end is answered in quadrupeds, by having these arteries curled and contorted in their passage, like a screw. The reason why nature has taken another method in man, Mr. Cowper observes, is, that in this case the abdominal muscles must have been larger than they are; by which means the intestines would have been frequently let down into the scrotum; an inconvenience which quadrupeds are secured from, by the horizontal position of their bodies. The spermatic arteries, in their progress, meeting with the spermatic veins, enter together with them the inner lamella of the peritonæum; where insinuating into the duplicature of the process, and being clothed therewith, they pass on to within three or four fingers breadth of the testicles, where they divide into two unequal branches, the biggest of which goes to the testicle, and is distributed therein; and the lesser in the parastrata or epididymis. See the articles **ARTERY**, **TESTICLE**, and **PARASTATA**.

The spermatic veins take the same course with the arteries, only a little above the testicles they split into several branches, which uniting, form a plexus, called the corpus pampiniforme, or pyramidale. The blood returned by the spermatic veins, is delivered on the right side to the cava, and on the left into the emulgent vein. Their nerves arise from the plexus of the pelvis and of the loins. See **VEIN**, **NERVES**, **CORPUS**, &c.

SPERMATOCELE, in medicine and surgery, the same with the cirsocele, or hernia varicosa. See **CIRSOCELE**.

SPERMATOPOEA, the name given to such medicines as are supposed to increase the semen.

SPEY, a river of Scotland, which, running north east, through Badenoch and Murray, falls into the German sea, east of the firth of Murray.

SPEZIA, a town of Italy, in the territory of Genoa, situated on a bay of the Tuscan sea, fifty miles south east of Genoa.

SPHACELUS, in surgery and medicine, an absolute and perfect corruption or death of the parts; whereby it is distinguished from a gangrene, which is that very great and dangerous degree of inflammation, wherein the parts affected begin to corrupt and put on a state of putrefaction. See **GANGRENE**.

In cases of a perfect sphacelus, or mortification, wherein the parts are become absolutely dead, and wholly without sense, and soft so as to retain the impressions of one's finger-end, and are plainly fetid and corrupted, all the medicines in the world will be insufficient to restore the parts to life again; and all that remains to be done, is the one miserable remedy for preserving the rest of the body, by cutting off that part, to prevent the mortification from spreading farther. A different method, however, is to be taken in this operation, according to the degree of the symptoms and the parts affected. If only some extremity of the foot, tarsus, metatarsus, ankle, or instep, or only the bare skin, and fat are sphacelated, the whole foot, in that case, ought not to be amputated, but preserving the limb entire, the surgeon is only to remove that part which is vitiated: and Heister's opinion is, that this is frequently best of all done by suppuration; or else by caustic medicines. When it is to be done by suppuration that is to be brought on as fast as possible; and when it is done, the crust or eschar, of the ulcer is to be suppurated from the sound parts with proper caution. To hasten effectually a suppuration in these cases, nothing is so serviceable as the making numerous long and deep scarifications near the sound parts; and afterwards the incised parts are to be well anointed with the common digestive ointment, and after that treated with the balsamic cataplasms and fo-

mentations, in common use on the like occasions. A fomentation also serviceable in these cases, is made by mixing, in a quart of a decoction of scordium, or of barley-water, vinegar of rue; six ounces; spirit of wine with venice-treacle, four ounces; and an ounce or two ounces of common salt; this is to be applied hot, with compresses, to the incised part, and frequently repeated till the disorder appears to spread no farther, which is known to be the case, when the tumour of the vitiated part subsides, and the edges of the sound part become tumid all round; and the second or third day after this, a suppuration is usually formed, and the sound parts become gradually separated from the vitiated. After this, to soften and promote a speedy separation of the eschar, the following cataplasm is always found highly serviceable: take of scordium, two handfuls; mallows, marsh-mallows, and henbane, of each one handful; lavender-flowers half a handful: let these be boiled to the consistence of a cataplasm in vinegar or oxycrate; and when in that state, add to them three ounces of the flour of linseed, one ounce of linseed-oil, and two ounces of sal armoniac. This is to be applied warm over the whole, and is to be retained in that condition, as long as shall be found necessary, by means of a brick boiled in water, and applied wrapped in a linen-cloth, or some other like means. See the articles SUPPURATION and FOMENTATION.

After these medicines have been used, and the whole surrounding skin is gently tumefied with redness, a crust or eschar is then formed by degrees, and the sound flesh begins to separate from the rest; by this we know that the disorder has done spreading, and that an entire suppuration of the vitiated parts will very shortly follow. When this separation shews itself beginning, it should be promoted as much as possible, by dressing the part with the common digestive, either alone, or mixed with venice-treacle, which must be retained on between the sound and the dead parts. To make way for this, it is sometimes necessary to divide them a little by the lancet; and when that is done, and the dressing has been applied, the before-described cataplasm should be laid on warm; and in all the succeeding dressings, whatever is found loose of the dead part must be carefully removed. And if it be necessary, from the adhesion of the vitiated parts to the sound, to use the scis-

sars, or scalpel, to divide them, this is always to be done with very little either of pain or danger; it will then be proper, to dress the part with the digestive, and a plaster of diachylon, or the like, over it, till the corrupted parts are entirely cast off, and the ulcer appears perfectly well cleansed, and the cure is then easily perfected in the common way.

This is the gentler and most common method: some surgeons, however, from the tediousness of it, have recourse directly, in these cases, to the caustic. They anoint either the edges only, or else the whole of the corrupted part, every day with butter of antimony, or the caustic-stone liquified, till the living parts are surrounded by a sort of eschar, applying afterwards the cataplasms before described, or others of the same kind, to prevent the disorder from spreading, and to make the corrupted parts separate from the sound: the corrosive lixivium of Boerhaave is greatly in repute, and much used on those occasions; it is made of three ounces of very strong quick-lime, mixed with nine ounces of pot-ashes, first ground separately to powder, and afterwards mixed, adding a little water; they are then to be put into a glass-vessel, and set in a cellar, to run by deliquium. As soon as they are found to become fluid, the matter must be put into a filtre of coarse paper, and the clear liquor that runs through, must be kept for use. It is to be used by dipping a brush, or feather into it, or rubbing it over the part affected, once or twice a day; or fine linen-rags may be wetted with it, and applied all over the part, not forgetting, however, at the same time, the use of the fore-mentioned cataplasm: this application is to be continued till the corrupted matter begins to cast off in crusts or scales; and when this is the case, it must be dressed with the common digestive; and, when perfectly cleansed, healed with a vulnerary balsam.

Another caustic highly commended by Belloste in these cases, is made by dissolving one part of crude mercury, in two parts either of spirit of nitre, or of aquafortis: this is to be rubbed over the parts as the former; and will occasion a speedy separation.

Finally, when the sphacelus is so deeply affixed in any part of the upper or lower extremity, that it has penetrated through the muscles so far as the bone, and has either resisted the force of all medicines, or

the

the proper time for applying them has been neglected, in this case, to preserve the rest of the body, the injured part must be amputated. See AMPUTATION.

SPHÆRANTHUS, in botany, a genus of the syngenesia-polygamia-necessaria class of plants, the general corolla whereof consists of hermaphrodite corollulæ in the center, and the female ones in the verge of the flower; the proper hermaphrodite one is monopetalous, funnel-shaped, and open, and quinquefid at the limb; there is scarce any female corolla; there is no pericarpium; the receptacle is naked; the seed is single, oblong, and naked.

SPHÆROCARPUS, in botany, a genus of the cryptogamia class of plants, consisting of foliaceous matter, expanded on the ground and producing very large and obvious fructifications. Dr. Hill thinks it probable, that the male flowers are produced on separate plants from the female, and have not been discovered to belong to the same species: no male parts of fructification are described to us; the female parts consist of a tubulated and inflated vagina, within which are contained a large globular capsule, containing a great number of small, loose seeds.

SPHÆROMACHIA, σφαίρομαχία, in antiquity, a particular kind of boxing, wherein the combatants had balls of stone, or lead, in their hands, which were called σφαίραι; hence the seventh part of the gymnasium, where this exercise was practised, was called the sphæristērion.

SPHAGNUM, in botany, a genus of the cryptogamia-muscorum class of plants, consisting of stalks furnished with leaves, and of capsules, in some respects resembling those of the bryum, but without any calyptræ, and standing on so short pedicles, that they do not appear to have any. Dr. Hill says, that the pedicles which support the capsules, grow in many of the species from the summits of the stalk; but Linnæus supposes it to be so in all, and makes it a part of the generical character.

SPHENOIDAL SUTURE, in anatomy, a suture thus called from its encompassing the os sphenoides, which it separates from the os frontis, the os petrosum, and the os occipitis. See SKULL, and the next article.

SPHENOIDES, or OS CRUCIFORME, in anatomy, the seventh bone of the cranium, or skull. See SKULL.

This bone is fixed in manner of a wedge among the other bones of the cranium,

and serves as a basis, as it were, to support several of them, and some of those of the upper jaw: the figure of this bone is very irregular; in its upper part is seen the sella equina, or turcica, under which there is a sinus; this is sometimes double, and opens into the nostrils; sometimes it is totally wanting: it is called the sphenoidal sinus. The sphenoides has thirteen apophyses; six of them are internal, and are placed near the sella equina; and the other seven are external; four of these are of a pterygoide form; and thence named pterygoide apophyses; two of the other three are very small and styloide, and the seventh is placed under the vomer: there are also three fossæ, or cavities, in this bone, one in the sella equina, and the other between the pterygoide apophyses.

SPHENOPHARYNGÆUS, in anatomy, a pair of muscles, called also the pterygopharyngæus. See PTERYGOIDÆUS.

SPHENOSTAPHYLINUS, in anatomy, a muscle of the larynx. It descends from a round fleshy origination, near the root of a process of the os sphenoides, and from thence runs obliquely to the uvula, and is inserted into its hinder and upper part, where it joins its partner. It serves to draw the uvula upwards and backwards, and hinders the masticated aliment from passing into the foramina narium, in deglutition.

SPHERE, *sphæra*, σφαῖρα, is a solid contained under one uniform round surface, such as would be formed by the revolution of a circle about a diameter thereof, as an axis. Thus the circle A E B D (plate CCLVIII. fig. 3. n° 1.) revolving about the diameter A B, will generate a sphere, whose surface will be formed by the circumference of the circle.

Definitions. 1. The center and axis of a sphere, are the same as the center and diameter of the generating circle: and as a circle has an indefinite number of diameters, so a sphere may be considered as having also an indefinite number of diameters, round any one of which the sphere may be conceived to be generated. 2. Circles of the sphere are those circles described on its surface, by the motions of the extremities of the chords E D, F G, I H, &c. at right angles to A B; the diameters of which circles are equal to those chords. 3. The poles of a circle on the sphere, are those points on its surface, equally distant from the circumference of that circle: thus A and B are the

the poles of the circles described on the sphere by the ends of the chords ED, FG, IH, &c. 4. A great circle of the sphere is one equally distant from both its poles; as that described by the extremities of the diameter ED, which is equally distant from both its poles A and B. 5. Lesser circles of the sphere are those which are unequally distant from both their poles; as those described by the extremities of the chords FG, HI, &c. because unequally distant from their poles A and B. See the article CIRCLE.

Axioms. 1. The diameter of every great circle passes through the center of the sphere; but the diameters of all lesser circles do not pass through the same center: hence also the center of the sphere is the common center of all the great circles.

2. Every section of a sphere by a plane, is a circle. 3. A sphere is divided into two equal parts, or hemispheres, by the plane of every great circle; and into two unequal parts, called segments, by the plane of every lesser circle. 4. The pole of every great circle is 90° distant from it on the surface of the sphere; and no two great circles can have a common pole.

5. The poles of a great circle are the two extremities of that diameter of the sphere, which is perpendicular to the plane of that circle. 6. A plane passing through three points on the surface of the sphere, equally distant from any of the poles of a great circle will be parallel to the plane of that great circle. 7. The shortest distance between two points, on the surface of a sphere, is the arch of a great circle passing through these points.

8. If one great circle meets another, the angles on either side are supplements to each other; and every spherical angle is less than 180° . 9. If two circles intersect each other, the opposite angles are equal. 10. All circles on the sphere, having the same pole, are cut into similar arches, by great circles passing through that pole.

Properties of the SPHERE. 1. All spheres are to one another as the cubes of their diameters. 2. The surface of a sphere is equal to four times the area of one of its great circles, as is demonstrated by Archimedes in his book Of the Sphere and Cylinder, lib. i. prop. 37. hence, to find the superficies of any sphere, we have this easy rule; let the area of a great circle be multiplied by 4, and the product will be the superficies: or, according to Euclid, lib. vi. prop. 20. and lib. xii.

prop. 2. the area of a given sphere, C E B D (*ibid.* n^o 2.) is equal to that of a circle, whose radius is equal to the diameter of the sphere BC. Therefore, having measured the circle described with the radius BC, this will give the surface of the sphere. 3. The solidity of a sphere is equal to the surface multiplied into one third of the radius: or, a sphere is equal to two thirds of its circumscribing cylinder, having its base equal to a great circle of the sphere. Let A B E C (*ibid.* n^o 3. and 4.) be the quadrant of a circle, and A B D C the circumscribed square, equal twice the triangle A D C: by the revolution of the figure about the right line A C, as an axis, a hemisphere will be generated by the quadrant, a cylinder of the same base and height of the square, and a cone by the triangle: let these three be cut any how by the plane H F, parallel to the base A B; and the section of the cylinder will be a circle, whose radius is F H; in the hemisphere, a circle whose radius is F E; and in the cone, a circle of the radius F G. But $EA^2 (=HF^2) = EF^2 + FA^2$: but $AF^2 = FG^2$, because $AC = CD$; and therefore $HF^2 = EF^2 + FG^2$; or the circle of the radius H F, is equal to a circle of the radius E F, together with a circle of the radius G F: and since this is true every where, all the circles together described by the respective radii H F, that is the cylinder, are equal to all the circles described by the respective radii E F and F G, that is, to the hemisphere and cone taken together. But by Euclid, lib. xii. prop. 10. the cone generated by the triangle D A C, is one third part of the cylinder, generated by the square B C, whence it follows, that the hemisphere generated by the rotation of the quadrant A B E C, is equal to the remaining two thirds of the cylinder, and that the whole sphere is two thirds of the cylinder circumscribed about it. Hence it follows, that a sphere is equal to a cone whose height is equal to the semi-diameter of the sphere, and its base equal to the superficies of the sphere, or to the area of four great circles of the sphere, or to that of a circle, whose radius is equal to the diameter of the sphere. See CONE, CIRCLE, CYLINDER, &c.

Circles of the SPHERE. See CIRCLE.

Projection of the SPHERE. See PROJECTION.

Sector or segment of a SPHERE. See the articles SECTOR and SEGMENT.

SPHERE, in astronomy, that concave orb,

or expanse, which invests our globe, and in which the heavenly bodies appear to be fixed, and at an equal distance from the eye.

The better to determine the places of the heavenly bodies in the sphere, several circles are supposed to be described on the surface thereof, hence called the circles of the sphere: of these, some are called great circles, as the equinoctial, ecliptic, meridian, &c. and others, small circles, as the tropics, parallels, &c. See each under its proper article.

Armillary SPHERE. See the article **ARMILLARY SPHERE**.

SPHERE of activity of a body, is that determinate space or extent to which, and no farther, the effluvia continually emitted from that body, reach; and where they operate, according to their nature. See the article **POWER**.

SPHERICAL ANGLE, TRIANGLE, and TRIGONOMETRY. See **ANGLE, TRIANGLE, and TRIGONOMETRY**.

SPHERICS, is that part of geometry which treats of the position and mensuration of arches of circles, described on the surface of a sphere. See the article **SPHERE**.

SPHEROID, in geometry, a solid, approaching to the figure of a sphere.

The spheroid is generated by the entire revolution of a semi-ellipsis about its axis. See the article **ELLIPSIS**.

Thus, if the semi-ellipsis **AHFB** (plate **CCLIX.** fig. 1. n° 1.) be supposed to revolve round its transverse axis **AB**, it will generate the oblong spheroid **AHFB C**. Now as all circles are as the squares described upon their radii; that is, the circle of the radius **EH**, is to the circle of the radius **EG**, as CF^2 to CD^2 , because $EH:EG::CF:CD$; and since it is so every where, all the circles described with the respective radii **EH**, (that is, the spheroid made by the rotation of the semi-ellipsis **AHB** about the axis **AB**) will be to all the circles described by the respective radii **EG**, (that is, the sphere described by the rotation of the semi-circle **ADB** on the axis **AB**) as FC^2 to CD^2 ; that is, as the spheroid is to the sphere on the same axis, so is the other axis of the generating ellipsis to the square of the diameter or axis of the sphere: and this holds whether the spheroid be formed by a revolution around the greater or lesser axis.

Hence it appears, that the half of the spheroid, formed by the rotation of the

space **AHFC**, around the axis **AC**, is double of the cone generated by the triangle **AFC**, about the same axis. Hence, also, is evident the measure of the segments of the spheroid, cut by planes perpendicular to the axis: for the segment of the spheroid, made by the rotation of the space **ANHE** round the axis **AE**, is to the segment of the sphere, having the same axis **AC**, and made by the rotation of the segment of the circle **AMGE**, as CF^2 to CD^2 . But the measure of this solid may be found with less trouble by this analogy; viz. as $BE:AC+EB::$ so is the cone generated by the rotation of the triangle **AHE** round the axis **AE**: to the segment of the sphere made by the rotation of the space **ANHE** round the same axis **AE**, as is demonstrated by Archimedes of conoids and spheroids, prop. 34. This agrees as well to the oblate as to the oblong spheroid. See the articles **SPHERE** and **SEGMENT**.

A spheroid is also equal to two thirds of its circumscribing cylinder. See the articles **CYLINDER** and **FRUSTUM**.

As to the superficies of a spheroid, Mr. Huygens gives the two following constructions in his *Horolog. Oscill.* For describing a circle equal to the superficies of an oblong and prolate spheroid: 1. Let an oblong spheroid be generated by the rotation of the ellipsis **ADBE**, (*ib.* n° 2.) about its transverse axis **AB**, and let **DE** be its conjugate; make **DF** equal to **CB**, or let **F** be one of the foci, and draw **BG** parallel to **FD**, and about the point **G**, with the radius **BG**, describe an arch, **BHA**, of a circle; then between the semi-conjugate **CD**, and a right line equal to **DE** + the arch **AHB**, find a mean proportional, and that will be the radius of a circle equal to the superficies of the oblong spheroid. 2. Let a prolate spheroid be generated by the rotation of the ellipsis **ADBE** (*ibid.* n° 3.) about its conjugate axis **AB**. Let **F** be one of the foci, and bisect **CF** in **G**, and let **AGB** be the curve of the common parabola whose base is the conjugate diameter **AB**, and axis **CG**. Then if between the transverse axis **DE**, and a right line equal to the curve **AGB** of the parabola, a mean proportional be taken, the same will be the radius of a circle equal to the surface of that prolate spheroid.

For the spheroidal figure of the earth, and the difference this must occasion in the

the meridional parts, used in the projection of Mercator's chart, see the articles **EARTH** and **MERIDIONAL**.

SPHINCTER, in anatomy, a term applied to a kind of circular muscles, or muscles in form of rings, which serve to close and draw up several orifices of the body, and prevent the excretion of the contents: thus the sphincter of the anus closes the extremity of the intestinum rectum. It has its origin from the bottom of the os coccygis, and the skin that is under this bone; and its fibres, from hence separating every way from one another, and surrounding the anus in every part, ascend afterwards in men into the lower part of the bulb of the urethra, or into the acceleratores muscles which surround this bulb, and are there terminated. In women, they are inserted into the lower part of the vagina of the uterus. Many fibres also descend from the interior and lower part of the os pubis, near the synchondrosis; and forming a body of an oval figure, and of the breadth of a man's thumb, they surround the extremity of the rectum; and when they act, have the same effect of drawing it together and closing it: there are indeed but few merely circular, or annular fibres, such as are usually said to compose the sphincter, observed in dissection. See the article **ANUS**.

The sphincter of the bladder is composed of a series of transverse fibres running crosswise, under the strait fibres of the neck of the bladder, in form of a circle, and serving to close it, to prevent the involuntary discharge of the urine. In men this is connected to the fibres of the intestinum rectum, and in women to those of the vagina. See **BLADDER**.

The sphincter gulæ, or, as it is otherwise called, the œsophagæus, is a single muscle, which serves for the constriction of the pharynx. This rises on each side of the os hyoides, and the thyroide, and the cricoide of the larynx, which surrounds the hinder part of the gulæ. See the article **PHARYNX**.

The sphincter of the pupil of the eye appears upon the posterior surface of the uvea when its blackness is cleared away, and is formed of circular fibres for contraction, as the ciliary fibres are for the dilatation of the pupil. See **EYE**.

The sphincter of the vagina is composed of a series of muscular fibres arising from the sphincter of the anus, and surrounds the orifice of the vagina; after which it

is inserted under the crura of the clitoris. For the sphincter of the lips, see the article **CONSTRUCTOR**.

SPHINX, σφιγξ, in sculpture, &c. a figure or representation of a monster of that name, famed among the antients, now mostly used as an ornament in gardens, terraces, &c. It is represented with the head and breasts of a woman, the wings of a bird, the claws of a lion, and the rest of the body like a dog. It is supposed to have been engendered by Typhon, and sent by Juno to be revenged on the Thebans. Its office, they say, was to propose dark enigmatical questions to all passers by; and if they did not give the explication thereof, to devour them. It made horrible ravages, as the story goes, on a mountain near Thebes, and could not by any means be destroyed, till after OEdipus had solved the following riddle, "What animal is it that in the morning walks on four legs, at noon on two, and at night on three?" The answer was "Man."

Among the Egyptians, the sphinx was the symbol of religion, by reason of the obscurity of its mysteries: and on the same account the Romans placed a sphinx in the porch of their temples.

SPICA VIRGINIS, a star of the first magnitude, in the constellation virgo. Its place is in the more southerly hand. Its longitude, according to Mr. Flamsteed, is $19^{\circ} 31' 22''$: its lat. $2^{\circ} 1' 59''$ south.

SPICE, any kind of aromatic drug that has hot and pungent qualities: such are pepper, nutmeg, ginger, cinnamon, cloves, &c. See the articles **AROMATIC**, **PEPPER**, &c.

Some also apply the word to divers other medicinal drugs brought from the east: as sena, cassia, frankincense, &c. See the article **SENA**, &c.

SPICE-ISLANDS, situated in the East-Indies. See the articles **BANDA**, **MOLUCCA-ISLANDS**, and **CEYLON**.

SPIDER, *aranea*, in zoology, an insect of a roundish or elliptic figure, having eight eyes placed on the hinder part of the thorax, and having also eight legs. This creature has a power of spinning. See the article **WEB**.

The species of spiders are very numerous; but authors have made them more so, by admitting among them other insects of a very different genera.

SPIDER-WORT, in botany. See the article **PHALANGIUM**.

SPIEL, in the glass-trade, an iron-instrument,

ment, hooked at the end and pointed, with which the workmen take the metal up out of the melting-pots, for proofs or essays, to see whether it be fit for work.

SPIGELBURG, a town of Germany, in the circle of Westphalia, capital of the county of Spigelsburg: east long. $9^{\circ} 25'$, north lat. $52^{\circ} 6'$.

SPIGELIA, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of a single petal, of the shape of a funnel: the tube is much longer than the cup, and is narrower below than above: the pericarpium consists of two globose fruits, growing together, and situated on the cup: the seeds are roundish very small, and numerous.

SPIGNEL, in botany, the english name of the plant athamanta. See the article **ATHAMANTA**.

SPIGNO, a town of Italy, in the dutchy of Monferrat: situated sixty miles south-east of Turin.

SPIKE, or *oil of SPIKE*, a name given to an essential oil distilled from lavender, and much used by the varnish-makers and the painters in enamel, and of some use in medicine. It is brought from Provence, and other parts of France, where the lavender is called *aspic*, and thence came the name of oil of spike. This oil, when in perfection, is very limpid; of a pleasant yellowish colour; very fragrant; possessing, in an eminent degree, the peculiar smell generally admired in the flowers. In medicine it is used, both externally and internally, in paralytic and lethargic complaints, rheumatic pains, and debilities of the nervous system. The dose is from one drop to five or six; but our artificers, in their varnishes, use more of this oil than the apothecaries do: and wanting it at a cheap rate, they have taught the druggists, who used to import and sell it to them, so many ways of adulterating it, that at present it is scarce any where to be met with genuine; and so coarse an ingredient as common oil of turpentine is used as the basis of all the counterfeits: they also sometimes adulterate it with spirit of wine. But both these cheats are easily discovered: that mixed with spirit of wine may be known by only mixing the whole with water, in which case the water, uniting with the spirit, leaves the oil at the top alone: that mixed with oil of turpentine, is discovered by burning a spoonful of it; for the genuine oil of spike burns with a

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clear flame and without smoke, and its smell, while burning, is very fragrant; whereas, when there is oil of turpentine mixed, it burns more furiously, emits a thick smoke, and is of a very bad smell. This oil is distilled from the smaller species of lavender, in the common way, by the alembic. See **LAVANDULA**.

SPIKENARD, *nardus*, in botany. See the article **NARDUS**.

Ploughman's SPIKENARD, in botany, the same with the conyza, or flea-bane. See the article **CONYZA**.

SPIKING up the ordonance, a sea-pharse, used for fastening a quoin with spikes to the deck close to the breech of the carriages of great guns, that they may keep close and firm to the ship's sides, and not get loose when the ship rolls, and by that means endanger the breaking out of a butt head of a plank. See **QUOIN**.

SPIILIMBERGO, a town of Italy, in the territory of Venice, and province of Friuli, situated forty-five miles north of Venice.

SPILSBY, a market-town of Lincolnshire; situated twenty-seven miles east of Lincoln.

SPINA BIFIDA, in anatomy, a parting of the spinal processes into two rows: the existence of such a case is doubted. See the article **SPINE**.

SPINA VENTOSA, in surgery and medicine, that species of corruption of the bones which takes its rise in the internal parts, and by degrees enlarges the bone, and raises it into a tumour, and which, when it happens to children, is termed by Severinus, and many others, *pædarthrocaces*. See the articles **PÆDARTHROCACES** and **TUMOUR**.

In the *spina ventosa*, the caries or erosion of the bone, is, according to Heister, occasioned by a depravity of the contained fluids, and generally arises spontaneously, or without any external causes: nor does it begin upon the surface of the bone, but between its lamellæ, or else in its internal cavity; from thence it extends, by degrees, to the external parts; and at length either affects the whole bone or a greater or smaller part of it; expanding itself to different widths, and rising to a tumour which is sometimes hard and without pain, and at other times feels as if it were filled with wind: it is attended with a greater or lesser degree of pain, pricking and shooting; at last it grows red, and is accompanied with other bad symptoms till

the disordered bone, being by degrees corroded, the common integuments, and other softer parts that lay over it, remaining at first intire, partake of the disorder; then foul ulcers of a very terrible sort break out. When tumours of the bone are hard, and the soft parts about them are not inflated, but free from redness, inflammation, and pain, as is very frequently the case in ricketty disorders, the bad symptoms just described seldom come on: this is properly the *pædarthrocaces*: but the painful, red, inflated tumours, happening equally to children and to adults, are the *spina ventosa*. It differs from a caries, by being attended with tumour; and from an exostosis, as this latter is an excrescence of the bone, whether attended with erosion or not. See the articles *CARIES*, *RICKETS*, *EXOSTOSIS*, &c.

The *spina ventosa* generally begins about the heads or epiphyses of the larger bones, where they are most tender and spongy, and where the noxious matter may not only have sufficient room to lodge in the cellular substance, but where it will also meet with the least resistance in softening and expanding the parts. The *os frontis* is subject to disorders of this kind in venereal cases; and it is frequently situated in the bones of the neck, face, and breast.

Though this disorder usually arises from internal, yet it is sometimes found to be owing to external causes, especially in persons constitutionally addicted to a disorder of this kind; when the vessels between the lamellæ of the bone, or in the medulla itself, are by a blow, fall, or other external violence, injured or torn. But the proximate cause of this disorder is either a collection, or congestion, of a viscid and thick, or of an acrimonious and corroding humour; or an inflammation arising in the medulla, or in the substance or cells of the bone degenerating into an abscess, and forming an ichor or pus. The collection of viscid and pituitous matter, and the expansion of the bones, sometimes happens without pain; but the erosion of the parts can never happen without the most acute pains. When the internal parts of the bones only are affected by this disorder, the pain does not increase upon external pressure. When the pain encreases upon external pressure, the external parts are brought into consent; and when this happens, the periosteum, and parts which

surround it, with the substance of the bone, and *tunica cellularis*, enlarge; from whence a sensation frequently arises as if the parts were filled with air or wind.

A *spina ventosa*, strictly so called, is by Heister divided into three degrees: the first is, when the patient complains of a grievous pain in the bone, which seems to him to proceed from the medulla. At this time there is no external pain nor tumour. In this state the disease is confined to the internal part of the bone. The second degree of the disease is, when after the pains a tumour appears upon the face of the bone, either hard or soft, and as it were windy, with external pain more or less. The third degree is, when after all the symptoms, an abscess is formed in the tumour, which either bursts spontaneously or is opened with the knife, and discharges a fetid ichor, or purulent matter, smelling like rank butter or lard.

There are two methods of treating this disorder: one suited to the two milder degrees of it, and the other to the more violent state of it. In the milder stages, Heister directs that the acrimony of the blood be corrected by large draughts of the decoctions of the woods with the china and sarsaparilla roots: that the parts affected be fumigated with the steam of decoctions of aromatic herbs; and twice a day, in the intermediate times, that the part be rubbed over with mercurial ointment, and afterwards covered with the common mercurial plaster. Mercurial medicines must also be given internally, according to the strength of the patient; and sometimes a salivation is necessary. By diligently pursuing this method for some weeks, the first and second stages of this disorder may be cured, even where there are bony tumours formed; and the tumours may either be reduced, or at least brought to that state, that they will remain as they are without farther increase or without pain, or any farther inconvenience. But when these tumours are so far advanced as to be out of the reach of remedies, the pains and tumours increasing, and abscesses forming, there is great reason to fear the entire destruction of the bone. If the abscess does not burst of itself, the surgeon must not wait for its maturation, but lay the bone bare, in the lowest or most painful part. When the abscess is already burst, if the opening

opening is too small it must be enlarged, either with the knife or a caustic; and after this several holes must be made in the bone with a small piercer, perforating it into the medulla, to give way for the discharge of the confined matter; and when these small holes are not sufficient, a larger must be made by the trepan, if the bone will admit it.

Whilst this is under cure, the patient must use, internally, the decoction of the woods, and mild mercurial and antimonial medicines; and externally, the wound must be treated with cleansing and balsamic remedies, such as decoctions of agrimony, fanicle, St. John's-wort, or birthwort, and essence of myrrh and aloes, which must be injected with a syringe twice every day, as may also a solution of mercurius dulcis, made in plantane-water or lime-water. Honey of roses should be added, in a small quantity, to either of the decoctions used as essences; and after the use of them the wound should be dressed with the forementioned essences, or with those of mastich, or amber, spread upon lint, and covered with a mercurial or other-plaster. This method is to be continued till the parts are healed. The actual cautery is sometimes necessary to root out the disorder, especially when it is only between the lamellæ of the bone. See CAUTERY. But when all these methods are unsuccessful, and the part is already too much corroded and destroyed, there is no hope of saving it, nor indeed the life of the patient, by any other means than cutting off the limb. When the disorder is situated, however, in some small bone, as on the carpus, tarsus, metacarpus, or metatarsus, or fingers, it will not be necessary to take off the whole limb, as it will frequently suffice to remove the corrupt bone alone. In larger bones, where the whole bone is not affected, but only a part of its external surface is disordered, by either a caries or a spina ventosa, the whole limb is by no means to be taken off, but the diseased part of the bone only removed: but when a large bone, as the os humeri, tibia, or femur, or an intire joint of the arm, knee, or foot, is diseased, there is no remedy but amputating it in the sound parts just above.

SPINACHIA, or **SPINACIA**, **SPINACH**, or **SPINAGE**, in botany, a genus of the dioecia-pentandria class of plants: the calyx of the male flower is divided into

five parts, having no corolla; the calyx of the female flower is divided into four parts, having no corolla neither: the styles are four: the seed is single, roundish, and inclosed within the cup, which becomes indurated.

This plant is well enough known in food, but has nothing to do in medicine, except in counterfeiting the colours of some things of value, as particularly giving to Gascoign's powder the same colour as is given by bezoar: however, the leaves of spinach are, by some writers, classed among the coolers.

SPINAL MARROW. See the article **MEDULLA SPINALIS**.

SPINALIS, in anatomy, the names of several muscles, &c. of the spine, but more particularly that of a muscle on the side of the neck, arising from the five superior processes of the vertebræ of the thorax, and the inferior of the neck; and which in its ascent, becoming more fleshy, is inserted into the inferior part of the vertebræ of the neck laterally. It serves to draw the neck backwards.

Other muscles of the back, neck, &c. called by some anatomists spinalis, are, 1. the spinalis cervicis, called by others transversalis: 2. spinalis colli minores, are muscles lying between the six spinal apophyses of the neck, and between the last of the neck and the first of the back, called by some interspinales. Other muscles of this name are, 3. the spinalis dorsi, being called by some, a part of the semi-spinatus; and by others a part of the longissimus dorsi. 4. The spinalis dorsi major, is a pretty long and slender muscle, lying upon the lateral parts of the extremities of the spinal apophyses of the back, called, by some, semi-spinalis. 5. Spinales dorsi minores are muscles of two kinds, some going laterally from the extremity of one spinal apophyses to another, being often mixed with the short fasciculi of the spinalis major; the rest lie directly between the extremities of two neighbouring spinal apophyses; being separated from those on the other side by the spinal ligament: these are sometimes termed interspinales. 6. Spinales, and transversales lumborum, are some fasciculi which run up from the superior false spines of the os sacrum, to the lower spinal apophyses of the loins. See the articles **MUSCLE**, **TRANSVERSALIS**, &c.

For the spinal nerves, &c. see the article **NERVES**, &c.

The spinal accessory nerve of Willis, is a sort of ninth pair of nerves of the neck, arising from the spinal marrow, about the origin of the third or fourth pair, and passing through the great foramen of the os occipitis up into the cranium: it is then joined to the par vagum, and coming out of the cranium again by the same aperture, it recedes from the par vagum, and is bent back to the musculus scapulæ cucullaris or trapezius.

SPINDLE, in the sea-language, is the smallest part of the ships capstan, which is betwixt the two decks. The spindle of the jeer-capstan has whelps to heave the viol. See the article **CAPSTAN**.

The axis of the wheel of a watch or clock, is also called the spindle. Among miners, the spindle is a piece of wood fastened into either stow blade.

SPINDLE-SHELL, in ichthyology, the slender tuberculous buccinum, with an elongated rostrum. See **BUCCINUM**.

SPINE, **SPINA-DORSI**, in anatomy, the bony column reaching from the head down to the anus; being the series or assemblage of vertebræ which sustain the rest of the body, contain the spinal marrow, and to which the ribs are connected. See the articles **VERTEBRÆ**, **MEDULLA SPINALIS**, and **RIBS**.

The usual division of the spine is into the neck, the back, the loins, and the os sacrum, and coccygis. See the articles **NECK**, **DORSUM**, &c.

Luxations, fractures, and other injuries of the SPINE. The signs common to luxations in the spine are chiefly the following: The back itself is found to be crooked after some external violence has been inflicted upon it; the patient can neither stand nor walk, and his whole body seems to be paralytic; the parts which are beneath the luxated vertebræ are nearly without all sense and motion; the excrement and urine cannot be discharged, or else they are sometimes emitted involuntarily; the lower extremities grow dead by degrees, and at length death itself follows: but these symptoms vary in proportion to the degree of violence in the luxation. Where there is but one vertebræ luxated, the curvature is gibbous, making a sort of angle: if the processes of the vertebræ are displaced forwards, then the spine will seem to bend inwards, and the pains will be more gentle; when the patient lies on his back: if the vertebræ is luxated on the right

side, the body will incline towards the left, and *vice versa*. Luxations of the spinal vertebræ are in general very difficult to reduce; but the following seems to be the best method of reducing them, according to Heister: When the apophyses are dislocated on both sides, the patient is to be laid leaning upon his belly over a cask, drum, or some other gibbous body, and then two assistants are strongly to press down both ends of the spine on each side; then the surgeon is to press down the luxated vertebræ, and at the same time to push nimbly the superior part of the body upwards, by which means, the luxated vertebræ are sometimes commodiously reduced into their right places: but if success should not attend the first time, the method should be repeated two or three times more. When the vertebræ comes out on one side, the patient is then to be placed as before, but so that when the left apophysis is displaced, one assistant may press the lower vertebræ inwards to the right, and another assistant may depress the right humerus, and *vice versa*. For the remainder, it seems proper, after the vertebræ are reduced, to bathe the spine with spirit of wine, or to lay on compresses dipped in spirit of wine camphorated, and to bind the parts up with the napkin and scapulary. See the article **LUXATION**.

When any of the vertebræ are fractured either by a fall, blow, or any other cause, without hurting the spinal marrow, it is to be supposed that the fracture is confined to some of the oblique or spinal processes, and therefore the patient will be in no great danger; but when the body of the vertebræ is either broke or split, and the contiguous spinal marrow bruised or compressed, all the parts of the limbs and viscera beneath that vertebræ will become immoveable and rigid, and death will sooner or later follow the accident: and if the transverse processes of the vertebræ are broke, which incline towards the cavity of the thorax, it is scarce possible that the heads of the ribs, which are there connected, should escape being fractured. These fractures are to be judged of from the nature of the external violence which occasioned them, from the pains seated about the affected vertebræ, and from the touch, eye, &c. When only the processes of the vertebræ are found broken, it will be much the best way to force them into their places with

with the fingers, placing narrow compresses dipt in warm spirit of wine on each side of the vertebræ, and over them slips of thick pasteboard, to be kept on by the napkin and scapulary. See the article FRACTURE.

When the spine is so injured that the spinal marrow is wounded, such wounds as are slight may be dressed with peruvian balsam, essence of myrrh, or medicines of a like nature, mixed with a quantity of honey of roses spread upon a pledget, and applied moderately warm; by which means, if the patient is of a good constitution, the parts sometimes heal, but large wounds here bring certain death.

For the luxations, fractures, &c. of the other parts of the spine, see the articles NECK, LOINS, SACRUM OS, &c.

SPINES of echini, in natural history. These in their fossil state make a great appearance in the cabinets of the curious, and in the works of the learned, and are of an almost infinite variety of kinds; and many of them are of the same figures and dimensions with those of the echini now living in our own and other seas, and well known to us. But beside these there are an almost infinite variety of others, which though allowed on all hands to be truly spines of some echini or other, yet evidently differ from those of all the known recent fish of that name, and have certainly belonged to species of it, which we have not yet the least knowledge of. These, however different in shape from one another, yet all agree in their texture and constituent matter, both with one another, and with the fossil remains that supply the places of the shells of the other species so common in our chalk-pits, all being composed of a plated, or tabulated spar. Both these shells and the spines, though they retain every outer lineament of the bodies they owe their form to, yet have they nothing of their interior texture, nor any the least resemblance of it, but are composed of plates set edgewise, or assant, in the shells, and in the spines always obliquely to the axis of the body; so that all the fossil spines of echini break regularly in an oblique direction, and always shew on each part a perfectly smooth, and glossy, slanting surface.

Of the fossil spines of echini some are long and slender, tapering from a broader basis to a fine point, and sometimes from

a thick part, at or near the middle, to an obtuse point at each end: these are usually striated, ridged, or furrowed, and often elegantly granulated, though sometimes they are smooth. These most resemble the spines of the more common species of recent or living echini we are acquainted with; others of them are of the same length with the common long ones, but are very flat, and are ridged more or less high, or covered with tubercles of different shapes; others are ragged, and variously jagged, and knotted like a rough branch of fir, stript of its leaves, or that sort of fucus called the sea-ragged-staff. The spines themselves are usually bedded in the strata of chalk, though sometimes they are found in the stone-quarries, and sometimes, but that most rarely, bedded in clay, or loose among gravel.

SPINET or SPINNET, a musical instrument ranked in the second or third place among harmonious instruments. It consists of a chest or belly made of the most porous and resinous wood to be found, and a table of fir glued on slips of wood called summers, which bear on the sides. On the table is raised two little prominences or bridges, wherein are placed so many pins as there are chords or strings to the instrument. It is played on by two ranges of continued keys, the former range being the order of the diatonic scale, and that behind the order of the artificial notes or semi-tones. The keys are so many flat pieces of wood, which, touched and pressed down at the end, make the other raise a jack which strike and sound the strings by means of the end of a crow's quill wherewith it is armed. The thirty first strings are of brass, the other more delicate ones of steel or iron wire: they are all stretched over the two bridges already mentioned. The figure of the spinet is a long square or parallelogram; some call it an harp-couched, and the harp an inverted spinet. See the article HARP.

This instrument is generally tuned by the ear, which method of the practical musicians is founded on a supposition, that the ear is a perfect judge of an octave and fifth. The general rule is to begin at a certain note, as C, taken towards the middle of the instrument, and tuning all the octaves up and down, and also the fifths, reckoning seven semi-tones to each fifth, by which means the whole is tuned. Sometimes to the common or fundamental

fundamental play of the spinet is added another similar one in unison, and a third in octave to the first, to make the harmony the fuller; they are either played separately or together by means of a stop; these are called double or triple spinets; sometimes a play of violins is added, by means of a bow, or a few wheels parallel to the keys, which press the strings and make the sounds last as long as the musician pleases, and heighten and soften them more or less, as they are more or less pressed. The harpsichord is a kind of spinet, only with another disposition of the keys. See the article HARPSICHORD.

SPINNING, in commerce, the act or art of reducing silk, flax, hemp, wool, hair, or other matters, into thread. Spinning is either performed on the wheel with a distaff and spindle, or with other machines proper for the several kinds of working. Hemp, flax, nettle-thread, and the like vegetable matters, are to be wetted in spinning; silks, wools, &c. are to be spun dry, and do not need water; but there is a way of spinning silk as it comes off the cases or balls, where hot and even boiling water is to be used.

SPINOSE LEAF, in botany, expresses a leaf whose disk or edge is armed with cartilaginous points, so firmly affixed that they cannot be separated without injuring the leaf itself.

SPINOUS FISHES, such as have some of the rays of the back-fins running out into thorns or prickles, as the perch, &c. See the article ICHTHYOLOGY.

SPINOZISM, or **SPINOSISM**, the doctrine of Spinoza, or atheism and pantheism proposed after the manner of Spinoza, who was born a Jew at Amsterdam.

The great principles of spinozism, is that there is nothing properly and absolutely existing besides matter and the modifications of matter; among which are even comprehended thought, abstract and general ideas, comparisons, relations, combinations of relations, &c.

The chief articles in Spinoza's system are reducible to these. That there is but one substance in nature, and that this only substance is endued with an infinite number of attributes, among which are extension and cogitation: that all the bodies in the universe are modifications of this substance considered as it is extended; and that all the souls of men are modifications of the same substance considered as cogitative: that God is a necessary and infinitely perfect being,

and is the cause of all things that exist, but not a different being from them: that there is but one being and one nature, and that this nature produces within itself, by an immanent act, all those which we call creatures; and that this being is at the same time both agent and patient, efficient cause and subject, but that he produces nothing but modifications of himself.

Thus is the deity made the sole agent as well as patient in all evil, both physical and moral; a doctrine fraught with more impieties than all the heathen poets have published concerning their Jupiter, Venus, Bacchus, &c. It is observed, that what seems to have led Spinoza to this system, was the difficulty of conceiving either that matter is eternal and different from God, or that it could be produced from nothing, or that an infinite and free being could have made a world such as this is. A matter that exists necessarily, and which nevertheless is void of activity, and subject to the power of another principle, is an object that startles our understanding, as there seems no agreement between the three conditions. It is also held, that a matter created out of nothing, seems to be no less inconceivable, whatever efforts we make to form an idea of the act of the will that can change what before was thought nothing into real substance. Besides, its being contrary to that known maxim of philosophers, *ex nihilo nihil fit*. In fine, that an infinitely good, holy, free being, should rather choose to have them wicked and eternally miserable, is no less incomprehensible; and the rather as it seems difficult to reconcile the freedom of man with the quality of a being made out of nothing. These, it is observed, appear to have been the difficulties which led Spinoza to search for a new system, wherein God should not be distinct from matter, and wherein he should act necessarily, and to the extent of all his power, not out of himself (*ad extra*) but within himself. But it is certain, that if this system rescues us from some difficulties, it involves us in others much greater. See the articles GOD, SOUL, NATURE, MATTER, EXISTENCE, SUBSTANCE, EXTENSION, GENERATION, CORRUPTION, ESSENCE, &c.

SPINSTER, in law, an addition usually given to all unmarried women from the vicount's daughter downwards; but according to Sir Edward Coke, generous

is a good addition for a gentlewoman; and that if such a person be named spinner in any original writ, appeal, or indictment, she may abate and quash the same.

SPIRÆA, in botany, a genus of the icosa-andria-pentagynia class of plants, with a rosaceous flower, consisting of five roundish, plane petals: its fruit consists of five oblong, compressed, acuminate capsules, each formed of two valves, and containing a few acuminate and small seeds.

This genus comprehends the white shrubby hypericum of authors.

SPIRAL, in geometry, a curve line of the circular kind, which, in its progress, recedes from its center.

A spiral, according to Archimedes, its inventor, is thus generated: if a right line, as A B (plate CCLIX. fig. 2.) having one end fixed at B, be equally moved round, so as with the other end A to describe the periphery of a circle; and, at the same time, a point be conceived to move forward equally from B towards A, in the right line B A, so as that the point describes that line, while the line generates the circle: then will the point, with its two motions, describe the curve-line B 1, 2, 3, 4, 5, &c. which is called the helix or spiral line; and the plane space, contained between the spiral line and the right line B A, is called the spiral space.

If also you conceive the point B to move twice as slow as the line A B, so as that it shall get but half way along the line B A, when that line shall have formed the circle; and if then you imagine a new revolution to be made of the line carrying the point, so that they shall end their motion at last together, there will be formed a double spiral line, and the two spiral spaces, as you see in the figure. From the genesis of this curve, the following corollaries may be easily drawn. 1. The lines B 12, B 11, B 10, &c. making equal angles with the first and second spiral (as also B 12, B 10, B 8, &c.) are in arithmetical proportion. 2. The lines B 7, B 10, &c. drawn any how to the first spiral, are to one another as the arches of the circle intercepted betwixt B A and those lines. 3. Any lines drawn from B to the second spiral, as B 18, B 22, &c. are to each other as the aforelaid arches, together with the whole periphery added on both sides. 4. The first spiral space is to the first circle as 1

to 3. And, 5. The first spiral line is equal to half the periphery of the first circle; for the radii of the sectors, and consequently the arches, are in a simple arithmetical progression, while the periphery of the circle contains as many arches equal to the greatest; wherefore the periphery to all those arches is to the spiral lines as 2 to 1.

SPIRAL, in architecture and sculpture, implies a curve that ascends, winding about a cone or spire, so as all the points thereof continually approach the axis. It is distinguished from the helix, by its winding around a cone, whereas the helix winds in the same manner around a cylinder.

Proportional SPIRALS, are such spiral lines as the rhumb lines on the terrestrial globe, which, because they make equal angles with every meridian, must also make equal angles with the meridians in the stereographic projection on the plane of the equator; and therefore will be, as Dr. Halley observes, proportional spirals about the polar point. See **RHUMB**.

SPIRAL-STAIRS. See **STAIR-CASE**.

SPIRATION, or rather **RESPIRATION**. See the article **RESPIRATION**.

SPIRE, *spira*, in architecture, was used by the antients for the base of a column, and sometimes for the astragal or tore. But, among the moderns, it denotes a steeple that continually diminishes as it ascends, whether conically or pyramidally. See the article **STEEPLE**.

SPIRE, in geography, an imperial city of Germany, capital of a bishopric of the same name, and situated in the palatinate of the Rhine, fifteen miles south-west of Heidelberg: east long. $8^{\circ} 17'$, north lat. $49^{\circ} 16'$.

SPIREBACH, a town of Germany, situated on a river of the same name, eight miles north of Landau.

SPIRIT, *spiritus*, in metaphysics, an incorporeal being or intelligence; in which sense, God is said to be a spirit, as are angels and the human soul. See the articles **GOD**, **ANGEL**, and **SOUL**.

The word spirit is, indeed, used in general to denote all thinking intelligent substances; but it would be the height of folly to imagine, because this name is applied to the Creator as well as to the human soul, that therefore they partake of one common nature, and differ only as different modifications of the same substance: wherefore, when we call God a spirit, we ought by no means rashly

rashly to presume, that he is so in the same sense in which the human soul is a spirit.

However, though we readily own there may be various ranks of spiritual beings; yet as we have no conceptions of the powers and operations of intellectual natures distinct from those of our own minds, we are necessitated to conceive of them in a manner suited to our knowledge; and when we would rank them into species, according to the degrees of superiority they are imagined in the scale of being, we ascribe to them what we find most excellent in ourselves, as knowledge, thinking, foresight, &c. and those in different measures, proportioned to the station peculiar to each rank. But that this is a very imperfect way of distinguishing the various orders of intellectual beings, needs not many words to make appear; especially if we consider, that the manner of communicating their thoughts without the intervention of bodily organs, is a thing to us altogether incomprehensible; which necessarily leads us to suppose, that they have ways of perception and knowledge, whereof our faculties cannot give us any notice. See the articles **ESSENCE, EXISTENCE, and SUBSTANCE.**

SPIRITS, or ANIMAL SPIRITS, in physiology. See **ANIMAL SPIRITS.**

Our perceptions and actions are supposed to depend on the facility with which these spirits pass from the brain to the nerves, and back from the nerves to the brain: for if the brain, the cerebellum, or the spinal marrow is hurt, there happens in all the parts where the nerves are distributed, which proceed from the disordered part, convulsions and palsies; and if any nerve is tied or cut, the parts below the ligature lose their sense and motion, while those above continue in their former state. See the articles **BRAIN, CEREBELLUM, MARROW, and NERVES.**

SPIRIT, in chemistry, a name applied to several very different substances; however, in general, it denotes any distilled volatile liquor that is not insipid, as phlegm, or pure water, nor inflammable as oil: but under this general idea are comprehended liquors of quite opposite natures, some being acid, and others alkaline; which last are such enemies to the former, that as soon as they are put together, they raise a violent effervescence, and grow hot: and to these may be added a third sort, called vinous or inflam-

mable spirits; which though very subtle and penetrating, are not manifestly either acid or alkaline.

All these sorts of spirits Mr. Boyle shews to be producible: and, 1. The vinous, which nature scarce ever produces of herself, are the creatures of vinous fermentation, or are actually produced, though not separated, in that operation. See the articles **FERMENTATION, BRANDY, RUM, RACK, &c.**

2. The alkaline or volatile spirits, called also the urinous, by reason of their affinity in many qualities with spirit of urine, are manifestly not simple but compound bodies; consisting of the volatile salt of the respective concretes dissolved in the phlegm, and for the most part accompanied with a little oil: so that these may be referred to the class of volatile salts. See the article **SALT.**

3. Acid spirits appear to be producible, because those drawn from common salt and nitre are very different in respect of taste, &c. from the bodies they are procured from, which are not properly acids: so that it does not appear that these spirits pre-existed in that state of those bodies.

What farther confirms this doctrine of spirits is, that the same body, merely by different ways of ordering it, may be brought to afford either acid, vinous, or urinous spirits; add, that whereas salt is accounted the principle of all taste, it follows that spirits, being sapid, must contain salt; since it is taste that characterizes and distinguishes it from phlegm, and denominates it acid, vinous, or urinous spirit.

Spirits, distilled from fermented liquors, consist of very different ingredients, *viz.* a pure spirit or alcohol, phlegm, a certain acetous fermented acid, and a small quantity of ill-scented oil; so that it becomes necessary, in order to obtain the spirit perfectly pure, to re-distil it several times, as directed under the articles **DISTILLATION and RECTIFICATION.** By reducing spirit, therefore, to the utmost degree of purity, an alcohol is obtained; which, as Dr. Shaw expresses it, is a liquor sui generis, and possessed of many peculiar qualities; as, 1. When absolutely purified, it is a uniform and homogeneous liquor, capable of no farther separation, without loss or destruction of some of its homogeneous parts. 2. It is totally inflammable, leaving no soot, nor any moisture behind. 3. It has

no peculiar taste or flavour, any more than pure water, except what is owing to its nature as alcohol, or perfectly pure spirit. 4. It is an unctuous and crispy fluid, running veiny in the distillation, and its drops rolling on the surface of any other fluid, like pease upon a table, before they unite. 5. It appears to be the essential oil of the body it is obtained from, broken very fine, and intimately and strongly mixed with an aqueous fluid, which is assimilated, or changed in its nature in the operation. 6. And lastly, it seems to be a kind of universal fluid, producible with the same properties from every vegetable subject; but to produce it thus, requires some care in the operation. See ALCOHOL.

On these principles is founded the opinion, that all spirits may be reduced to a perfect similarity, or sameness, from whatever subject they are produced, and on this depends their convertibility into one another; for when once they are brought to this standard of simplicity, there needs nothing more than to add the oil of such of the finer spirits as is required to convert the spirit into that particular kind. By this means the same tasteless spirit, whether obtained from malt, sugar, or grapes, may be made into either malt spirit, brandy, or rum, by adding the essential oil of the grape, sugar, or malt; and thus what was once malt spirit, shall become brandy, or whatever else the operator pleases.

Many methods have been attempted to obtain the first point, that is, the reducing the spirit to perfect and pure alcohol: the most practicable means seem to be long digestion, and the repeated distillation from water into water, where the essential oil will at once be left upon two surfaces, and the acid imbibed: the shorter ways, are those by rectifying from neutral absorbent salts and earths; such are sugar, chalk, and the like; and, lastly, the use of fixed alkalies may be tried, for these very forcibly keep down both the phlegm and oil; inasmuch that this last method promises to be the shortest of all, if the art were known of utterly abolishing the alkaline flavour, which the alcohol is apt to acquire.

For as vinous spirits arise with a less degree of heat than watery liquors, if due regard be had to this circumstance, very weak spirits may, by one or two watery distillations, in a degree of heat less than that in which water boils, be tolerably

well freed of their aqueous phlegm: and in order to free it from its foul oil, add to every gallon of it a pound or two of pure, dry, and fixed alkaline salt; which being digested together for some time, the alkali, from its known property of attracting water and oils, will imbibe the remaining phlegm, and such part of the disagreeable unctuous matter as may be still left in the spirit, and sink with them to the bottom of the vessel. If the spirit be now again gently drawn over, it will arise entirely free from its phlegm and nauseous flavour; but as some particles of the alkaline salt are apt to be carried up with it, and give it an urinous relish, a small proportion of any fixed acid liquor, or rather of an acid salt, as vitriol or alum, should be added to it.

The spirit obtained by this process is called alcohol, and is extremely pure, limpid, perfectly flavourless, and fit for the finest purposes: it may be reduced to the strength commonly understood by proof spirit, by mixing twenty ounces of it (by weight) with seventeen ounces of water. The distilled cordials made with these spirits, are much more elegant and agreeable than when the common rectified or proof spirits of the shops are made use of.

There are many occasions in which chemists, and other artificers, stand in need of the true and purest alcohol; the least remainder of water rendering the operation unsuccessful: hence it is absolutely necessary we should have some marks, by which to distinguish whether our alcohol be pure or not. The principal of these are, 1. If the supposed alcohol contains any oil dissolved in it, and so equally distributed through it, that it is no ways perceptible, then upon pouring of water into it, the mixture will grow white, and the oil separate from the alcohol. 2. If any thing of an acid lies concealed in the alcohol, a little of it mixed with the alkaline spirit of sal ammoniac will discover the acid by an effervescence excited by the affusion of the acid; for otherwise there would be only a simple coagulation. 3. If there be any thing of an alkali intermixed, it will appear by the effervescence excited by the affusion of an acid. 4. But it is a matter of great difficulty to discover whether there be any water intermixed with it. The best method of doing this is the following: take a chemical vessel with a

long narrow neck, the bulb of which will hold four or six ounces of alcohol. Fill this two thirds full with the alcohol you intend to examine, into which throw a dram of the purest and driest salt of tartar, coming very hot out of the fire; then mix them by shaking them together, and set them over the fire till the alcohol is just ready to boil. Being thus shaken, and heated, if the salt of tartar remains perfectly dry, without the least sign of moisture, we are sure that there is no water in the alcohol. The learned Boerhaave tells us, that by this method he discovered water in alcohol which had been looked upon as pure, having undergone every other method of trial.

Medicinal virtues of SPIRITS. The too free use of inflammable or vinous spirits, is attended with very bad effects; as the body is thereby greatly attenuated, the strength impaired, and the brain stupified. However, as Dr. Pringle justly observes, we ought not to confound the necessary and moderate use of spirits, with the vice of indulging in them to excess. So far, therefore, from thinking the moderate use of spirits detrimental to soldiers, and others, who are exposed to the extremes of heat and cold, and to moist and bad air, that he even recommends it; and as to soldiers in particular, he observes, that spirits, even when drank to excess, tend more to weaken the constitution than to produce any of the common camp-diseases. Hence, in establishing messes among the soldiers, which he thinks would be attended with many good consequences, he also recommends some regulations to be made with regard to an allowance of spirits, whether by stoppages on the pay or otherwise: this he enforces by observing that the like practice already obtains in the navy, and probably for the same reasons for which it would be proper in the army; since, in ships, the men are also liable to distempers arising from moist and corrupted air. It is the abuse, therefore, of vinous spirits that ought to be condemned; since, taken in moderation, they can do no harm; and if properly accommodated to circumstances, may have very good effects.

Spirits are also of use, in external applications, to wounds and sores; as they stimulate the fluids, resist putrefaction, and quicken the pulse when absorbed. Tinctures of absorbent and aromatic powders are often prescribed with the

same intention; by reason they partake of the nature of their ingredients, but principally of the spirit.

As to the volatile spirits, distilled from animal and other substances, they are in general extremely pungent and acrimonious; applied to the skin, and prevented from exhaling, they inflame the part, and produce the effect of caustics; they also liquify the animal-juices, and dissolve the coagula made from them with acids; with which being mixed, they effervesce, and unite into a neutral salt. With regard to their medical virtues, they stimulate the nervous system, attenuate viscid humours, promote a diaphoresis, and other natural secretions, and absorb acidities in the primæ viæ: they are particularly useful in the lethargic and apoplectic cases, in hypochondriacal and hysterical disorders, and the languors, head-achs, inflations of the stomach, flatulent colics, and other symptoms which attend them. However, they are generally found more serviceable to aged persons, and in phlegmatic habits, than in the opposite circumstances: in febrile and inflammatory distempers, they are hurtful, except in such fevers as are accompanied with a cough, hoarseness, and redundancy of phlegm: they are most conveniently exhibited in a liquid form, largely diluted with water, or other convenient liquors; the dose being from five or six to thirty or more drops.

The acid spirits drawn from fossils, and applied to animal bodies, coagulate the fluids, and mortify the solids: by being diluted with water, they approach to the nature of vinegar. Metallic substances, dissolved in these spirits, increase their corroding sphacelating quality, so as sometimes to occasion convulsions.

As for the spirituous distilled waters, which make no small part of the shop-medicines, see the article WATER.

SPIRITUAL, in general, something belonging to, or partaking of, the nature of spirit. See the article SPIRIT.

The spiritual courts, in law, are such as have jurisdiction in matrimonial causes, and for probate of wills, and granting administration of goods; as also in regard to tythes, and in cases of defamation, &c. See the articles COURT, WILL, ADMINISTRATOR, &c.

SPIRITUALITIES of a bishop, are the profits that he receives as a bishop, and not as a baron of parliament; such are the duties of his visitation, presentation-money,

money, what arises from the ordination and institution of priests, the income of his jurisdiction, &c. See BISHOP.

SPITAL, a town of Carinthia, in Germany: east long. $13^{\circ} 28'$, north lat. 47° .

SPITHEAD, a road between Portsmouth and the Isle of Wight, where the royal navy of Great Britain frequently rendezvous.

SPIT-INSECT, in zoology, the cicada with brown wings, and two white spots on them, and a double white line. See the article CICADA.

SPITTLE, *saliva*, in physiology. See the article SALIVA.

SPITZBERGEN, or GROENLAND. See the article GROENLAND.

SPLACHNUM, in botany, a genus of mosses; the calyx of the male flower is a smooth, conic calyptra; the antheræ are cylindric, and the receptacle coloured, membranaceous, and very large; the calyx of the female flower, which is on a distinct vegetable, is stilted, and the peristylls are numerous, central, short, and coloured.

SPLAIT, or SHOULDER-SPLAIT, among farriers. See SHOULDER-SPLAIT.

SPLEEN, σπλιν, *lien*, in anatomy, is a viscus of a deep blackish-red colour, situated on the left side of the stomach, under the diaphragm, near the ribs, and above the left kidney. Its figure is somewhat uncertain; but is usually like that of a tongue, being hollow towards the stomach, and convex towards the diaphragm and ribs; however, it is often irregular, and has in many parts fissures. It is connected with the stomach, by the vasa brevia, and with the pancreas, omentum, the diaphragm, and left kidney by membranes. Its size is various, but is usually five or six inches long, three broad, and one inch thick, in the human body: in dogs, hogs, and many other animals, it is much larger and thinner. In human subjects, the spleen has but one membrane; but in calves, and some other animals, it has two: in this case, the external one is robust, common, and adheres but laxly, by means of the sanguiferous vessels, to the inner one, which is proper and very thin, and, when the outer one is taken off, transmits the breath. The vessels of the spleen, considering its size, are remarkably large: its artery is from the coeliac, and is called the splenic artery; and in human subjects really transmits water, air, or mercury, thrown into it, into the veins: the splenic vein

is, like those of the other viscera, very much ramified, and its branches are carried throughout the whole spleen; but, in calves, &c. it is soon after its ingress into the spleen, transformed into cells: in calves also, both vessels enter at one extremity; but in the human body, they are divided into various branches, and run over the whole concave or internal surface: the nerves of the spleen are from the plexus splenicus: the spleen has no excretory duct; but there are in it lymphatic vessels, running to the receptacle.

The substance of the spleen has been said to be cellulose and glandulose: in calves, indeed, it is cellulose; but in man, it is vasculose and fibrose. What authors have described as glands in the spleen, Ruysch has proved to be only vessels; all the glands about the spleen being only one or two lymphatic ones, of about the bigness of a bean, situated without it near where the vessels enter.

The use of the spleen has been much controverted by authors; but the most probable opinion seems to be, that it serves to render the blood more fluid, out of which the bile is to be afterwards secreted; and that by this means obstructions, which must otherwise be frequent, are prevented, and the secretion of the bile promoted.

Infarction of the SPLEEN. In this case, the spleen swells, together with the left adjacent region; and sometimes there is a tension of the belly: this disease is increased by rest, and too rich a diet; and therefore exercise, and a spare diet are proper; as are acids, as vinegar, or thin and austere wine; and, in general, all meats and drinks, which have the virtue of promoting urine, as the seeds of trefoil, cummin, parsley, wild thyme, hyssop, and savory; and the herbs rocket, spleenwort, and cresses. See the article HYPOCHONDRIAC PASSION.

SPLEEN WORT, *louchitis*. See the article LONCHITIS.

SPLENETIC, a person affected with obstruction of the spleen. See SPLEEN and HYPOCHONDRIAC PASSION.

SPLENIC VESSELS, the artery and vein of the spleen. See the article SPLEEN.

SPLENIUS, in anatomy, a pair of the extensor muscles of the head, which rising from the lower vertebra of the neck, and the five upper ones of the back, is inserted a little above the mastoid process. See the article MUSCLE.

SPLENT, or **SPLINT**, among farmers, a callous, insensible excrescence, breeding on the shank bone of horses; which, when it grows big, spoils the shape of the leg, and generally comes upon the inside: but if there be one opposite to it on the outside, it is called a peg, or pinned splent; because it does, as it were, pierce the bone, and is extremely dangerous.

The simple splents are only fastened to the bone, at a pretty distance from the knee, and without touching the back sinew, and have not a very bad consequence; but those that touch the back sinew, or are spread on the knee, will make a horse lame in a short time.

For the cure of this malady, shave away the hair, and rub and beat the swelling with the handle of a shoeing hammer; then having burnt three or four hazle-sticks, while the sap is in them, chafe the splent with the juice, or water that issues out at both ends, applying it as hot as you can, without scalding the part; after that, rub or bruise the swelling with one of the sticks, and continue frequently to throw the hot juice upon the part, but so as not to scald it, and continue still rubbing it, till it grows soft. Then dip a linen-cloth, five or six times double, in the hazle-juice, as hot as your hands can endure it, and tie it upon the splent, where let it remain for twenty-four hours, keeping the horse in the stable for the space of nine days, not suffering him to be either ridden or led to water; by which time, the splent will be dissolved, and the hair will afterwards grow on it again.

SPLENTS, or **SPLINTS**, in surgery, pieces of wood, used in binding up broken limbs. See the article **FRACTURE**.

SPLICING, in the sea-language, is the untwisting the ends of two cables or ropes, and working the several strands into one another by a fidd, so that they become as strong as if they were but one rope. See the article **CABLE**, &c.

SPLINTER, a small shiver of wood, or the like. The splinters of fractured bones, if loose, are to be carefully removed, otherwise replaced. See the article **FRACTURE**.

SPODIUM, in pharmacy, one of the foulest recrements of copper; being nothing but the worst and heaviest parts of the cadmia ostracitis, thrown up in such coarse pieces by the blast of the bellows, that it does not adhere to the roof or sides

of the furnace, but falls down again into several parts of the furnace; and being collected along with many other kinds of foulnesses, in form of a blackish heavy matter, is indeed no better than the sweepings of the furnaces, where the copper is refined. See the article **CADMIA**.

SPOILS, *spolia*, whatever is taken from the enemy, in time of war.

Among the antient Greeks, the spoils were divided in common among the whole army, only the general's share was largest; but among the Romans, the spoils belonged to the republic.

SPOLETTO, the capital of Umbria, in Italy; it is situated fifty miles north-east of Rome.

Spondees, *spondæus*. in antient poetry, a foot consisting of two long syllables, as *omnes*. See the article **FOOT**.

Some give the appellation spondaic to verses composed wholly of spondees, or at least that end with two spondees; as, *Constitit, atque oculis Phrygia agmina circumspexit*.

SPONDIAS, **HOC PLUM**, in botany, a genus of the enneandria-trigynia class of plants, the flower of which consists of five ovated, plane, and patent petals; and its fruit is an oval berry, containing four nuts in each cell. It is called monbin by Plumier.

SPONDYLUS, in anatomy, a name antiently given to a vertebra of the spina dorsa. See the article **VERTEBRÆ**.

SPONGIA, **SPUNGE**, in botany, &c. See the article **SPUNGE**.

SPONGIOSE, in anatomy, an appellation given to several parts of the body, on account of their porous and cavernous texture, not unlike that of sponge; as the spongiose or ethmoide bone of the nose, the spongiose bodies of the penis. See the articles **NOSE** and **PENIS**.

SPONSORS, among christians, are those persons, who, in the office of baptism, answer, or are sureties, for the persons baptized. See the article **BAPTISM**.

In the antient church, there were three sorts of sponsors, 1. For children, who could not answer for themselves; and in most cases, parents were sponsors for their own children. 2. For such persons as, by reason of sickness or infirmity, were in the same condition with children; who might be baptized, if their friends testified, that they had before-hand desired baptism, and at the same time became their sponsors. 3. For all adult persons in general; for these too had their

their sponsors, as no persons were baptized without them.

It is observable, that antiently no more than one sponsor was required, namely, a man for a man, and a woman for a woman: however, in the case of infants, no regard was had to the difference of sex; for a virgin might be sponsor for a male child; and a father for his children, whether male or female.

In the modern christian church, the office of sponsors, or sureties in baptism, is better known than practised; we call them god-fathers and god-mothers. See the article GOD-FATHERS.

SPONTANEOUS, a term applied to such motions of the body, and operations of the mind, as we perform of ourselves, without any constraint. See FREEDOM.

SPONTANEOUS, or EQUIVOCAL GENERATION. See EQUIVOCAL.

SPOON-BILL, *plataea*, in ornithology. See the article PLATEA.

SPOONING, in the sea-language, is said of a ship, which, being under sail in a storm at sea, is unable to bear it, and consequently forced to put right before the wind.

SPORADES, among antient astronomers, a name given to such stars, as were not included in any constellation. See the articles CONSTELLATION and STAR.

SPORADIC DISEASES, among physicians, are such as seize particular persons at any time or season, and in any place; in which sense they are distinguished from epidemical and endemic diseases; the former whereof are peculiar to certain times or seasons, and the latter to certain places or countries. See the articles EPIDEMIC and ENDEMIC.

SPORTULA, in roman antiquity, a dole of meat or money, given by great men to the poor.

SPOTS, in astronomy, certain places of the sun's or moon's disc, observed to be either more bright, or darker, than the rest; and accordingly, called *faculae* and *maculae*. See the articles FACULÆ and MACULÆ; as also SUN and MOON.

SPOUT, or WATER-SPOUT, in natural history, an extraordinary and dangerous meteor, observed at sea, and sometimes at land, called by the Latins *typho* and *spho*. Its first appearance is in form of a deep cloud, the upper part of which is white, and the lower black: then from the lower part of this cloud hangs, or rather falls down, what is properly called the spout, in form of a conical tube,

biggest at top; and under this tube, there is always a great boiling and flying up of the water of the sea, as in a *jet d'eau*. For some yards above the surface of the sea, the water stands as a column or pillar, from the extremity whereof it spreads and goes off, as in a kind of smoke. Frequently, the cone descends so low, as to touch the middle of this column, and continue for some time contiguous to it; though sometimes it only points to it, at some distance, either in a perpendicular or oblique line. Frequently it is scarce distinguishable, whether the cone or the column appear the first, both appearing all of a sudden against each other. But sometimes the water boils up from the sea to a great height, without any appearance of a spout pointing to it, either perpendicularly or obliquely. Indeed, generally, the boiling or flying up of the water has the priority, this always preceding its being formed into a column. Generally, the cone does not appear hollow, till towards the end, when the sea-water is violently thrown up along its middle, as smoke up a chimney. Soon after this, the spout or canal breaks and disappears; the boiling up of the water, and even the pillar, continuing to the last, and for some time afterwards; sometimes till the spout form itself again, and appear anew; which it sometimes does several times in a quarter of an hour. See plate CCLIX. fig. 3.

M. de la Pyme, from a near observation of two or three spouts in Yorkshire, described in the Philosophical Transactions, gathers that the water-spout is nothing but a gyration of clouds by contrary winds, meeting in a point or center; and there, where the greatest condensation and gravitation is, falling down into a pipe or great tube, somewhat like Archimedes's spiral screw; and, in its working and whirling motion, absorbing and raising the water, in the same manner as the spiral screw does; and thus destroying ships, &c. Thus, June the 21st, he observed the clouds mightily agitated above and driven together; upon which they became very black, and were hurried round, whence proceeded a most audible whirling noise, like that ordinarily heard in a mill. Soon after, issued a long tube or spout, from the center of the congregated clouds, wherein he observed a spiral motion like that of a screw; by which the water was raised

up. Again, August 15, 1687, the wind, blowing at the same time out of several quarters, created a great vortex and whirling among the clouds; the center whereof, every now and then, dropped down, in shape of a long, thin, black pipe, wherein he could distinctly behold a motion like that of a screw, continually drawing upwards, and screwing up, as it were, wherever it touched. In its progress it moved slowly over a grove of trees, which bent under it like wands in a circular motion. Proceeding, it tore off the thatch from a barn, bent a huge oak-tree, broke one of its greatest branches, and threw it to a great distance. He adds, that, whereas it is commonly said, the water works and rises in a column, before the tube comes to touch it; this is doubtless a mistake, owing to the fineness and transparency of the tubes, which do most certainly touch the surface of the sea, before any considerable motion can be raised therein; but which do not become opaque and visible, till after they have imbibed a considerable quantity of water.

The dissolution of water-spouts he ascribes to the great quantity of water they have glutted; which by its weight impeding their motion, whereon their force, and even existence, depends, they break and let go their contents; which use to prove fatal to whatever is found underneath.

A notable instance hereof we have in the Philosophical Transactions, related by Dr. Richardson; for a spout in 1718 breaking on Emott-moor, nigh Coln, in Lancashire, the country was immediately overflowed.

In Pliny's time, the seamen used to pour vinegar into the sea, to assuage and lay the spout, when it approached them: our modern seamen keep it off, by making a noise with filing and scratching violently on the deck, or by discharging great guns to disperse it.

SPOUTING FOUNTAIN. See the article **FOUNTAIN**.

SPRAIN, or STRAIN. See **STRAIN**.

SPRAT, in ichthyology, a species of clupea, with the lower jaw longest, and the belly very acute. See **CLUPEA**.

The sprat has been generally, but erroneously, supposed a herring, not grown to its full size; its usual length is about four or five inches, and its breadth somewhat more, in proportion, than in the herring; there is a spot on each side, near the extremity of the coverings of the

gills. It is caught in most of our seas, and brought in surprising quantities to London.

SPREE, a river of Germany, which, rising in Bohemia, runs northward, through Lusatia, and, entering Brandenburg, visits Berlin, and falls into the Havel, a little west of that city.

SPRING, *fons*, in natural history, a fountain or source of water, rising out of the ground. See the article **WATER**.

Various have been the opinions of philosophers concerning the origin of springs; but those, which deserve notice, are only the three following ones.

1. That the sea-water is conveyed thro' subterraneous ducts, or canals, to the places where the springs flow out of the earth: but as it is impossible that the water should be thus conveyed to the tops of mountains, since it cannot rise higher than the surface, some have had recourse to subterraneous heats; by which being rarified, it is supposed to ascend in vapours through the bowels of the mountains. But as no sufficient proof is brought of the existence of these central heats, or of caverns in the mountains big enough to let the vapours ascend, supposing such heats, we shall not take up our reader's time with a formal refutation of this hypothesis.

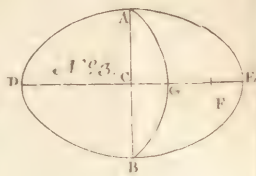
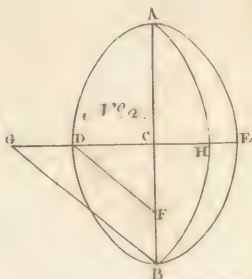
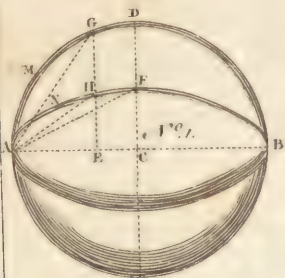
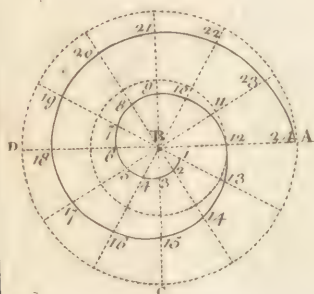
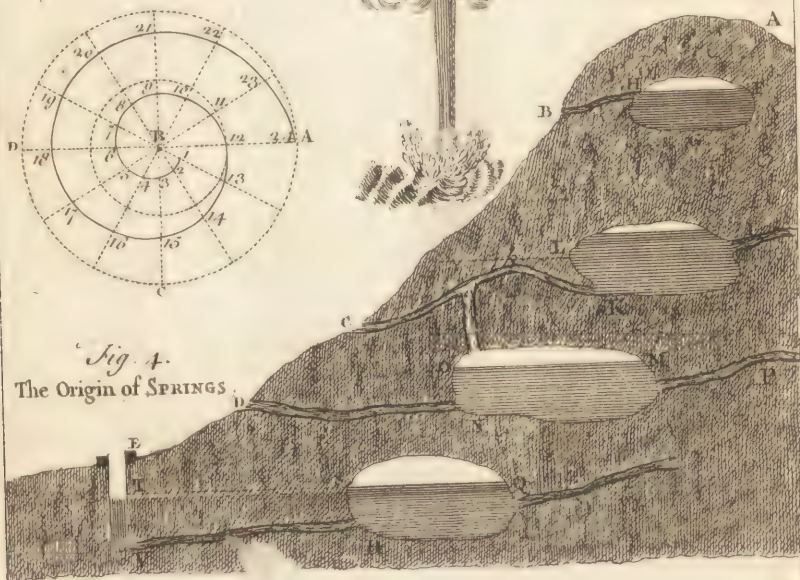
2. As to those who advance the capillary hypothesis, or suppose the water to rise from the depths of the sea through the porous parts of the earth, as it rises in capillary tubes, or through sand or ashes, they seem not to consider one principal property of this kind of tube, or this sort of attraction: for though the water rise to the top of the tube or sand, yet will it rise no higher, because it is by the attraction of the parts above that the fluid rises, and where that is wanting it can rise no farther. Therefore, though the waters of the sea may be drawn into the substance of the earth by attraction, yet it can never be raised by this means into a cistern, or cavity, to become the source of springs.

3. The third hypothesis is that of the sagacious naturalist, Dr. Halley, who supposes the true sources of springs to be melted snow, rain-water, dew, and vapours condensed.

Now in order to prove, that the vapours, raised by the heat of the sun, from the surface of the seas, lakes, and rivers, are abundantly sufficient to supply the springs and rivers with fresh water, the doctor

made



Fig. 1. SPHERIOD.*Fig. 2. SPIRAL.**Fig. 3. A WATER-SPOUT.**Fig. 4. The Origin of SPRINGS.**Fig. 5. The SQUIRREL.**Fig. 6. SPUR-SHEL.*

made the following experiment: he took a vessel of water, made of the same degree of saltness with that of the sea, by means of the hydrometer; and having placed a thermometer in it, he brought it, by means of a pan of coals, to the same degree of heat with that of the air in the hottest summer. He then placed this vessel with the thermometer in it, in one scale, and nicely counterpoised it with weights in the other; after two hours, he found, that about the sixtieth part of an inch was gone off in vapour, and consequently in twelve hours, the length of a natural day, one tenth of an inch would have been evaporated.

From this experiment it follows, that every ten square inches of the surface of the water yield a cubic inch of water in vapour per day, every square mile 6914 tons, and every square degree (or 69 english miles) 33 millions of tons. Now, if we suppose the Mediterranean to be 40 degrees long, and 4 broad, at a medium, which is the least that can be supposed, its surface will be 160 square degrees, from whence there will evaporate 3280 millions of tons per day, in the summer-time. See the article SEA.

The Mediterranean receives water from the nine great rivers following, *viz.* the Iberus, the Rhine, the Tyber, the Po, the Danube, the Neister, the Borysthenes, the Tanais, and the Nile; all the rest being small, and their water inconsiderable. Now let us suppose that each of these rivers conveys ten times as much water to the sea as the Thames; which, as is observed, yields daily 76,032,000 cubic feet, which is equal to 203 millions of tons; and therefore all the nine rivers will produce 1827 millions of tons; which is little more than one third of the quantity evaporated each day from the sea. The prodigious quantity of water remaining, the doctor allows to rains, which fall again into the seas, and for the uses of vegetation, &c.

As to the manner in which these waters are collected, so as to form reservoirs for the different kinds of springs, it seems to be this: the tops of mountains, in general, abound with cavities, and subterraneous caverns formed by nature to serve as reservoirs; and their pointed summits, which seem to pierce the clouds, stop those vapours which fluctuate in the atmosphere, and being condensed thereby, they precipitate in water, and by their

gravity easily penetrate through beds of sand and lighter earth, till they are stopped in their descent by more dense strata, as beds of clay, stone, &c. where they form a basin or cavern, and work a passage horizontally, and issue out at the side of the mountain.

Many of these springs running down by the vallies, between the ridges of hills, and uniting their streams, form rivulets or brooks; and many of these, again, uniting on the plain, become a river.

Different sorts of SPRINGS. Springs are either such as run continually, called perennial; or such as run only for a time, and at certain seasons of the year, and therefore called temporary springs. Others again are called intermitting springs, because they flow and then stop, and flow and stop again; and, finally, reciprocating springs, whose waters rise and fall, or flow and ebb, by regular intervals. In order to account for these differences in springs, let ABCDE (plate CCLIX. fig. 4.) represent the declivity of a hill, whose section, from top to bottom, is shewn in the figure; in which let FGH be a cavern or basin near the top, which collects the water gleeing through the strata, and has a drain or duct leading to the side of the hill at B. It is evident, that, when the water arises to the drain H, it will descend through it to B, where it will break out in form of a fountain or spring, and will continue running while the reservoir is supplied with water above the level FH, and after that it will become dry. Hence we see that a spring may be formed near the tops of the highest hills and mountains; but, on the very tops, it is impossible for them to be generated.

Intermitting springs, or those which flow and stop by regular alternations and intermissions, may be thus accounted for: let IKL (*ibid.*) represent a cavity in the mountain, to which, at I, there is a feeding stream which brings the water from other parts; and at K, on the lower part, there goes a duct KkC, of a curved or crooked form, which conveys the water to the side of a hill at C, where it breaks out into a spring. Now, it is evident, that, as the water rises in the cavern, it will also rise in the duct, till the surface of the water IL be level with the highest part k of the duct, and then the water will descend from k to C, which point, being lower than the orifice

erifice of the duct at K, will exhaust the cavern of all its water, and then the spring will stop, till the cistern is replenished to the same level I K, by the feeding stream I, and then the fountain will play again. An artificial fountain of this kind may be also easily made.

Reciprocating springs, or those which flow and ebb alternately, are occasioned in the following manner: let MNO (*ib.*) represent a reservoir, fed by the stream PM, and also a siphon KkO, which brings water from another cavity above, as I K L; the duct ND carries the water to the side of the hill at D, and there makes a constant spring by virtue of a constant supply of water by the drain PM. The water at D will also flow and ebb alternately; for when the siphon KkO works, the surface of the water MO will be suddenly raised, and press upon the water at N with a greater force, by which means it will issue out at D with a greater velocity, and raise the surface, if confined; but when the siphon intermits or ceases, the momentum of the water at D is not so great as before, and then the spring will sink or decrease.

In like manner we account for the rising of water in wells. Thus suppose a well be sunk at the foot of the hill at E, (*ibid.*) to such a depth EV, as will bring the diggers to an eruption of a spring at V, whose water is brought by the duct RV (or many of them) from a cavity QRS in the hill (or otherwise from a pond, a river, the sea, &c.) it is evident the water in the well will rise from the bottom V, to an altitude VT, where the surface of the water at T is upon a level with that in the reservoir QS, and thus constitutes a well.

Now, though every thing may not happen precisely in the manner, as here represented, yet that it is in some way analogous to it, we believe no person will doubt, who has been at the Peak in Derbyshire, or at Wookey-hole in Somersetshire, and seen the wonderful caverns, receptacles, and streams of water, which nature has there furnished in the bowels of the mountains.

Medicinal virtues, &c. of SPRINGS. These are owing to the different qualities and temperament of the strata through which these waters may be collected, or pass: if those reservoirs of water in the body of mountains be situated where mineral ores abound, or the ducts and feeding streams run through mineral earths, it is

easy to conceive that particles of metals will mix with, and be absorbed by the water, which being saturated therewith becomes a mineral spring or well. Salt, sulphur, lime-stone, &c. abound in the strata, through which the water passes, it will then be saline, sulphureous lime-water, &c. If sulphur and iron should both abound in the parts of the hill, whence the waters come, the water will partake of the warmth or heat which is occasioned by the mixture of two such substances in the earth, where they are found. See the articles MINERAL WATERS, CHALYBEATE, SEA, BATH, &c.

SPRING, ver. in cosmography, implies one of the seasons of the year; commencing in the northern parts of the world, on the day the sun enters the first degree of Aries, which is about the twenty-first of March, and ending when the sun leaves gemini. See EQUINOX and SEASONS.

SPRING, elater. in mechanics, denotes a thin piece of tempered steel, or other elastic substance; which, being wound up serves to put several machines in motion by its elasticity, or endeavour to unbend itself: such is the spring of a clock, watch and the like. See the articles ELASTICITY, CLOCK, WATCH, &c.

The spring of a lock, gun, pistol, or the like, is a piece of steel, violently bent which, being set at liberty, beats back the bolt of the lock, or strikes down the cock.

SPRING-TIDE. See the article TIDES.

SPRINGE, among sportsmen, a device made of twisted wire, to catch birds and small beasts.

SPRINGING of a mast, in the sea-language, is when it cracks, but is not quite broken in any part of it; as the partners hounds, &c. See the articles MAST PARTNERS, &c.

SPRINGING a leak. See the article LEAK.

SPRINGY BODIES, the same with elastic ones; or such as, having had their figure changed by the stroke of another body can recover again their former figure which bodies not elastic cannot do. See the article ELASTICITY.

SPROTAW, a town of Silesia, 15 mile west of Glogaw: east long. 15° 45' north lat. 51° 36'.

SPUNGE, *spongia*, in botany, a genus of submarine plants, belonging to the cryptogamia lithophyta class: it consists of soft, tough, and elastic matter, formed usually into rude masses of a cavernous structure, and having very little of the appearance of plants.

Upon a nice examination, sponge appears to be composed of capillary fibres, which are hollow and implicated in a surprising manner; and are surrounded by thin membranes which arrange them into a cellular form. This structure, no less than the constituent matter, of sponge, renders it the fittest of all bodies to imbibe a great quantity of any fluid, and upon a strong pressure to part with almost the whole quantity again.

Sponge pays, on importation, a duty of $7\frac{7}{10}$ d. the pound; and draws back, on exportation, $6\frac{8}{10}$ d.

Sponge calcined to a blackness, and reduced to powder, has been lately brought into great use as a sweetner of the blood, and a diuretic: some have pretended even to cure leprosy with it, and others have extolled it against the bite of a mad dog; but these are virtues less certainly known of it.

In the larger and coarser pieces of sponge, there are often small stones found imbedded in the substance of the matter; and yet, more frequently, a crustaceous sparry matter gathered round the surface of certain parts of the plants; both these substances are called by the common name of lapis spongiæ, the sponge-stone; and both are recommended as diuretics, and remedies against the stone and gravel. See the article SPAR.

Pyrotechnical SPUNGES, are made of the large fungous excrescences growing on old oaks, ashes, fir, &c. which being boiled in common water, then dried and well beaten, are put in a strong lye prepared with salt-petre, and again dried in an oven. These make the black match or tinder brought from Germany, used to receive and sustain the fire struck from a flint and steel, &c.

SPUNGE, is also used, in gunnery, for a long staff or rammer with a piece of sheep or lamb-skin wound about its end, to serve for scouring great guns, when discharged, before they are charged with fresh powder.

SPUNGE of a horse shoe, the part next the heel, where the calkins are made. See the article HORSE SHOES.

SPUNGING, in gunnery, the cleaning a gun's inside with a sponge, in order to prevent any sparks of fire from remaining in her, which would endanger the life of him who should load her again.

SPUN-YARN, among sailors, is a kind of line made from rope-yarn, and used for seizing or fastening things together.

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SPUNK, one of the names of the female agaric. See the article AGARIC.

SPUR, a piece of metal, consisting of two branches encompassing a horseman's heel, and a rowel in form of a star, advancing out behind, to prick the horse.

SPUR-SHELL, *eperon*, in natural history, a species of cochlea, with the edges of its volutions serrated; so that, in several positions, it resembles a spur with large rowels. See plate CCLIX. fig. 6. and the article COCHLEA.

SPUR-WAY, a road through another's ground, through which one may ride, by right or custom.

SPURGE, in botany, the english name of the euphorbia. See EUPHORBIA.

SPURGE-LAUREL, *daphne*. See the article DAPHNE.

SPURIOUS DISEASES, such as, in some symptoms, cannot be reduced to any one kind; and, therefore, are denominated from those with which they agree in most particulars: thus we say, a spurious or bastard pleurisy, quincy, &c. See the articles PLEURISY, QUINZY, &c.

SPURKETS, in a ship, spaces between the upper and lower futtocks, or betwixt the rungs fore and aft.

SPURRY, in botany, the english name of several species both of alsine and spergula. See ALSINE and SPERGULA.

SPUTUM, among physicians, denotes the same with the saliva, or spittle. See the article SALIVA.

SPY, a person hired to watch the actions, motions, &c. of another; particularly of what passes in a camp. When a spy is discovered, he is hanged immediately.

SQUACCO, in ornithology, a bird of the heron kind, of a yellowish colour, and the head and neck variegated with black, white and yellow. It is a native of the coast of the Levant. See HERON.

SQUADRON, in military affairs, denotes a body of horse whose number of men is not fixed; but is usually from one to two hundred.

Each squadron usually consists of three troops, of fifty men each. See the articles ARMY and HORSE.

SQUADRON of ships, a division or part of a fleet, commanded by a vice-admiral, or commodore. See FLEET and NAVY.

SQUAIOTTA, in ornithology, a species of heron, of a brown colour, with a black and white crest, somewhat larger than the squacco, or former species.

SQUALUS, the SHARK KIND, in ichthyology, a numerous genus of fishes, of the

chondropterygious order; the characters of which are these: the foramina of the gills are five on each side, and are situated in a longitudinal direction, from the sides of the head down to the pectoral fins; the head is of a depressed form; the body is oblong, and is either rounded or angulated, and the skin is rough; the eyes stand on the sides of the head; the tail is bifid, and the upper part longer than the under; the mouth is usually transverse, and in the under part of the rostrum, not at its extremity.

The species of this genus, being very numerous, are arranged under the following subdivisions. 1. Those which have granulated teeth, as the saw-fish, and the smooth hound-fish. 2. Those which have acute teeth, and prickles on the back; as the common hound-fish, the shagreen-fish, centrine and monk-fish. 3. Those which have acute teeth, but no spines or prickles on the back; as the zygæna, or ballance fish, the sea-fox, and the tope. 4. Those which have the rostrum shorter than usual; as the bounce, morgag, and blue and white sharks. See the articles SAW-FISH, HOUND-FISH, &c.

SQUAMÆ, SCALES, in natural history. See the article SCALE.

SQUAMARIA, in botany, a genus of the didynamia-angiospermia class of plants, with a monopetalous ringent flower, both lips of which are entire, only the upper one is longest; the fruit is a roundish unilocular capsule, containing a great many round seeds.

SQUAMOUS, or **SQUAMOSE**, in anatomy, an appellation given to the spurious or false sutures of the skull, because composed of squamæ or scales like those of fishes, or like tiles laid so as to reach over one another. See the article SKULL.

SQUARE, quadratum, in geometry, a quadrilateral figure, both equilateral and equiangular.

To find the area of a square, seek the length of one side; multiply this by itself, and the product is the area of the square.

SQUARE-NUMBER, the product of a number multiplied into itself. See the articles INVOLUTION and POWER.

Thus 4, the product of 2 multiplied by 2; or 16, the product of 4 multiplied by 4, are square numbers.

SQUARE ROOT, a number considered as the root of a second power or square number; or a number, by whose multiplication into itself, a square number is gene-

rated. See the article EXTRACTION.

SQUARE BATTLE, or **BATTALION** of men, is one that hath an equal number of men in rank and file. See BATTLE.

Hollow SQUARE, in the military art, is a body of foot drawn up with an empty space in the middle for the colours, drums, and baggage; faced and covered by the pikes every way, to keep off horse.

SQUARE, norma, an instrument consisting of two rulers, or branches, fastened perpendicularly at one end of their extremes, so as to form a right angle: it is of great use in the description and mensuration of right angles, and laying down perpendiculars.

SQUATT, among miners, a small bed of ore less valuable than a vein or load, as reaching only a little way.

SQUATINA, the **MONK-FISH**, or **ANGEL-FISH**, a species of squalus, with the mouth at the extremity of the head: it grows to about six feet in length, and is considerably thick in proportion. See the article SQUALUS.

SQUILL, scilla, in botany. See SCILLA.

SQUILLA, in zoology, a genus of insects with ten legs, the foremost pair of which is cheliform, or made for pinching: the eyes are two, and the tail is foliated.

These are the characters of the shrimp, as also of the cray-fish, lobster, and crab; of each of which there are numerous species. See the article CANCER, &c.

SQUILLACE, a bishop's see of the farther Calabria, in the kingdom of Naples, which gives name to the gulph of Squillace: east long. 17°, north lat. 39°.

SQUINANCY, or **ESQUINANCY**, in medicine, the same with the quincy. See the article QUINCY.

SQUINTING, strabismus, in medicine and surgery. See the article STRABISMUS.

SQUIRREL, sciurus, in zoology, the english name of a genus of quadrupeds of the order of the glires, the fore-teeth of which are prominent; it has no canine teeth; and its legs are formed both for climbing and leaping.

The common reddish-brown squirrel, with a white belly, is a very lively little animal, with an extremely long and bushy tail. See plate CCLIX. fig. 5.

But besides this, there are several other species; as the american grey-squirrel, with a smaller tail, and twice as large as the common kind; the ceylon blackish squirrel, with a very large tail, and about the size of the common squirrel; the flying squirrel, with the sides extended,

as to be able to leap from one tree to another at a great distance; and, lastly, the barbary squirrel, of a blackish tawney-brown colour, with variegated sides.

ST, an indeclinable term chiefly used to command silence.

The Romans had these two characters written over the doors of their eating rooms, as if one should say *sed tace*, or *silentium tene*. Porphyry observes, that the antients made a point of religion of it, not to speak a single word in passing in or out of the doors.

STABLE, a place or house for horses, &c. furnished with stalls and proper apartments to contain their food, &c. See the article **HORSE**, &c.

Nothing conduces more to the health of a horse than the having a good and wholesome stable. The situation of a stable should always be in a good air, and on a firm, dry, and hard ground, that in winter the horse may go out and come in clean. It should always be built somewhat on an ascent, that the urine and other foulnesses may be easily conveyed away by means of trenches or sinks for that purpose. As there is no animal that delights more in cleanliness than the horse, or that more abominates bad smells, care should be taken that there be no hen-roost, hog-stie, or necessary house, near the place where the stable is to be built; for the swallowing of feathers, which is very apt to happen when hen-roosts are near, often proves mortal to horses; and the steams of a bog-house, or hog's-dung, will breed many distempers. The walls of a stable, which ought to be of brick rather than stone, should be made of a moderate thickness, two bricks, or a brick and a half at least, for the sake of warmth in the winter, and to keep out the heat in the summer. The windows should be made on the east and north side of the building, that the north wind may be let in to cool the stables in the summer, and the rising sun all the year round, especially in winter. The windows should either be sashed, or have large casements, for the sake of letting in air enough; and there should always be close wooden shutters, that the light may be shut out at pleasure, by which means the horse may be made to sleep in the day as well as in the night, when it is judged proper he should do so. Many pave the whole stable with stone, but that part which the horse is to

lie on should be boarded with oak-planks, which should be laid as even as possible, and cross-wise rather than length-wise; and there should be several holes bored through them to receive the urine, and carry it off underneath the floor into one common receptacle: the ground behind should be raised to a level with the planks, and it should be paved with small pebbles. There are two rings to be placed on each side of the stall, for the horse's halter to run through, and a logger is to be fixed to the end of this sufficient to poise it perpendicularly, but not so heavy as to tire the horse, or to hinder him from eating; the best place for him to eat his corn in is a drawer or locker, made in the wall or partition, which need not be large, so that it may be taken out at pleasure to clean it, by which means the common dirtiness of a fixed manger may be avoided. Many people are against having a rack in their stables; they give the horse his hay sprinkled upon his litter, and if they think he treads it too much, they only nail up three or four boards, by way of a trough, to give it to him in: the reason of this is, that the continual lifting up of the head to feed out of the rack, is an unnatural posture for a horse, who was intended to take his food up from the ground, and makes him, as they express it, withy cragged. When there is stable-room enough, partitions are to be made for several horses to stand in; these should always allow room sufficient for the horse to turn about and lie down conveniently, and they should be boarded up so high towards the head, that the horses placed in separate stalls may not be able to smell at one another, nor molest each other any way. One of these stalls ought to be covered in, and made convenient for the groom to lie in, in case of a match, or the sickness of a horse. Behind the horses there should be a row of pegs, to hang up saddles, bridles, and other utensils; and some shelves for the brushes, pots of ointments, &c. The other requisites for a stable are a dung-yard, a pump, and a conduit.

STABLE-STAND, in the forest law, is one of the four evidences or presumptions whereby a person is convicted of an intention to steal the king's deer in the forest; as when any person is found, at his stand in the forest, with his bow

bent ready to shoot at a deer, or standing close by a tree with grey-hounds in a leash, ready to slip. See **FOREST**.

STABLO, a town of Germany, in the circle of Westphalia and bishopric of Liege, situated ten miles south of Limburg.

STACK of wood, among husbandmen, a pile of wood three feet long, and as many broad, and twelve feet high.

STACHYS, **BASE HOAR-HOUND**, in botany, a genus of the didynamia-gymnospermia class of plants, the corolla whereof consists of a single ringent petal; the tube is very short; there is no pericarpium; the calyx contains four oval and angular seeds.

This plant is cephalic, diuretic, and a promoter of the menses.

STADIUM, an antient greek long measure. See the article **MEASURE**.

Stadium was also the course or career wherein the Greeks ran their races. Vitruvius describes it as an open space 125 paces long, terminated at the two extremes with two posts called by the Romans *carcer* and *meta*. Along the stadium was built a kind of amphitheatre, where the spectators were placed to see the *athletæ* exercise running, wrestling, &c. There were stadia likewise covered over with colonnades and porticos, serving for the same exercises in bad weather.

STADE, a town of Germany, in the circle of Lower Saxony and dutchy of Bremen, situated on the west side of the river Elbe, seventeen miles west of Hamburg.

STADTHOLDER, **STADTHOULDER**, or **STATHOLDER**, the principal governor or magistrate of the united provinces.

The stadtholder seems to be impowered, either directly or by his influence, to change both the deputies, magistrates, and officers in every province and city. He is president in the states of every province, though he has not so much as a seat or vote in the states-general: but as he influences the states of each province to send what deputies he pleases to the states-general, he has, in effect, the appointing the persons that constitute the states-general, and may be termed sovereign of the united provinces. The stadtholders had once a very great power. We find one of their stadtholders appointing what towns should send deputies, or members, to the assembly of the states of Holland: but the stadtholdership was never hereditary till now; when

in the year 1747 it was made so in the family of Orange.

It is observed that the states passed by the stadtholder's eldest son, and appointed his younger son, prince Maurice of Orange, their stadtholder: and at other times they have suppressed the stadtholdership intirely. The stadtholder always, in the council of state, when the votes happen to be equal, has a decisive voice.

STAEHELINA, in botany, a genus of the syngenesia-polygamia-æqualis class of plants, the general corolla whereof consists of uniform floscules scarce rising above the cup; the proper corolla is monopetalous and funnel-shaped: the limb is quinquifid, equal, acute, and campanulated: there is no pericarpium: the seed contained in the cup is solitary, oblong, very short, tetragonal, and coronated with a downy pap of the length of the cup.

STAFF, *baculus*, an instrument ordinarily used to rest on in walking. The staff is also frequently used as a kind of natural weapon both of offence and defence, and for several other purposes.

STAFF, in music, five lines on which, with the intermediate spaces, the notes of a song, or piece of music, are marked. Guido Aretin, the great improver of modern music, is said to be the first who introduced the staff, marking his notes by setting points (.) up and down them to denote the rise and fall of the voice; and each line and space he marked at the beginning of the staff with pope Gregory's seven letters, A, B, C, D, E, F, G. See the article **NOTE**.

But others will have this practice of an older date; and Kircher particularly affirms, that in the Jesuits Library at Messina, he found a greek manuscript of hymns above seven hundred years old, wherein some hymns were written, on a staff of eight lines, marked at the beginning with eight greek letters. The notes, or points, were on the lines, but no use made of the spaces.

STAFF, **BASTON**, or **BATTON**, in heraldry. See the article **BASTON**.

Bac STAFF. See **BACK-STAFF**.

Fore-STAFF. See **FORE STAFF**.

Pastoral-STAFF. See **PASTORAL-STAFF**.

STAFF-OFFICERS. See **OFFICERS**.

STAFFORD, the county town of Staffordshire, is situated one hundred and thirty miles north-west of London.

It sends two members to parliament.

The county of Stafford is bounded by

Chc-

Cheshire, on the north-west; by Derbyshire, on the north east; by Worcestershire, on the south; and by Shropshire, on the west.

STAG, in zoology, a species of the cervus, with ramose, cylindric and crooked horns. See the article CERVUS.

This is a very stately and beautiful animal. People are apt to confound it with the common fallow deer, but with great impropriety, being of twice the size, and different in many other respects: the head is remarkably large: the neck strong and thick: the eyes are full and large: the ears long and patulous: the horns tall, almost erect, and of a beautiful form; they rise each with a single and elegant stem, which continues its form to the top, only sending off branches and divarications: they are hairy when once formed, but afterwards they become very strong and lose that downy appearance. The body of the stag is rounded and plump: the back somewhat flattened, and the belly prominent: the legs are long: the hoofs cloven: the fur deep, thick, and of a tawny-reddish colour.

STAG-BEETLE. See CERVUS-VOLANS.

STAG-HUNTING. See HUNTING.

STAGE, in the modern drama, the place of action and representation, included between the pit and the scenes, and answering to the proscenium, or pulpitum, of the antients.

The laws of the stage are the rules and decorums to be observed, with regard to the œconomy and conduct of a dramatic performance to be exhibited on the stage. These relate principally to the unities, the disposition of the acts and scenes, the unravelling, &c. See the articles DRAMA, ACTION, &c.

STAGGERS, or **STAVERS**, in the manege. See the article STAVERS.

STAIN, a town of Germany, in the circle of Austria, situated on the Danube, one hundred and forty miles west of Vienna.

STAINES, a town of Middlesex, situated nineteen measured miles west of London.

STAIR-CASE, in architecture, an ascent inclosed between walls, or a balustrade, consisting of stairs, or steps, with landing-places and rails, serving to make a communication between the several stories of a house.

The construction of a complete stair-case is one of the most curious works in architecture. The common rules to be

observed therein are as follow: 1. That it have a full free light, to prevent accidents of slipping, falling, &c. 2. That the space over head be large and airy, which the Italians call *un bel sfocato*, i. e. good ventilation, in regard a man spends much breath in mounting. 3. That the half-paces, or landing-places, be conveniently distributed for repassing in the way. 4. That to prevent encounters, &c. the stair-case be not too narrow: however, this last is to be regulated by the quality of the building. 5. That care be taken in placing the stair-case, so as the stairs may be distributed without prejudice to the rest of the building.

The kinds of stair-cases are various: in some the stairs are straight, in others winding, in others both ways, or mixed. Again, of straight stairs, called also fliers: some fly directly forwards, others are square, others triangular, and others are called french flights. Of winding-stairs, called also spiral or cockle-stairs: some are square, some circular, and some elliptical: and these again are various; some winding round a solid, and others round an open newel. Lastly, of mixed-stairs: some are called dog-legged, others both wind about a solid newel, and fly about a square open newel.

Stair-cases being of great importance in building, it will be necessary to give a particular account of each kind. First, straight-stairs are such as always fly; that is, proceed in a right line, and never wind; whence their denomination. Of these there are several kinds, as, 1. Straight-fliers, or plain-fliers, which proceed directly from one floor to another, without turning either to the right or left: these are seldom used, except either for garret or cellar-stairs. 2. Square-fliers, which fly round the sides of a square newel, either solid or open, having at every corner of the newel a square half step, taking up one fourth of a circle, so that they fly from one half pace, or step, to another; and the length of the stairs is perpendicular to the side of the newel. 3. Triangular-fliers are those which fly round by the sides of a triangular newel, either solid or open, having at each corner of the newel a trapezial half-step, taking up two thirds of a circle, so that they fly from one half step to another, and their length is perpendicular to the side of the newel.

4. French fliers, those which fly first directly

rectly forwards, till they come within the length of a stair of the wall, and then have a square half-pace, from which you immediately ascend to another half-pace, from which the stairs fly directly back again, parallel to their first flight.

Secondly, Winding-stairs are such as always wind and never fly: of these there is great variety: as, 1. Circular winding stairs; of which there are four kinds, *viz.* such as wind about a solid newel, the fore-edge of each being in a right line, pointing to the center of a newel; commonly used in church-steeple and great old houses: such as wind round an open newel, the fore side of each being in a right line, pointing to the center of the newel, as those in the monument of London: such as wind round a solid newel, only the fore-side of each an arch of a circle, either concave or convex, pointing near to the circumference of the newel, and such as resemble the last in all other respects, save that they have an open newel. Any of these winding-stairs take up less room than the other kinds. In stairs that wind round a solid newel, architects make the diameter of the newel either one sixth, or one fourth, or one third, or three sevenths, of the diameter of the stair-case, according as that is in bigness: if very small, the newel is but one sixth; and if large, three sevenths, &c. In stairs that wind round an open newel, Palladio orders the newel to be one half of the diameter of the stair-case, though there does not appear any reason why the newel here should not be proportioned to the stair-case, as in the former. As to the number of stairs in each revolution, Palladio orders, that if the stair-case be six or seven feet diameter, the stairs in each revolution to be twelve; if the diameter be eight, the stairs to be sixteen; or if nine or ten, the stairs to be twenty; and if eighteen, to be twenty-four. 2. Elliptical winding-stairs, whereof there are two kinds, the one winding round a solid, the other round an open newel: they are much of the same nature with circular stairs, excepting that in the one the newel is a circle, and in the other an ellipsis. 3. Square winding-stairs are such as wind round a square newel, either solid or open, the fore side of each stair being a right line pointing to the center of the newel. 4. Triangular winding stairs are such as wind round a triangular newel, the fore side of each being a right line pointing to

the center of the newel. 5. Columniated winding stairs. Palladio mentions a stair-case in Pompey's portico, at Rome, set on columns, so as the light they receive from above may distribute itself to all parts alike. 6. Double winding-stairs. Scamozzi mentions a stair-case in this form made by Piedro del Bergo and Jean Coffin, at Sciamburg, in France, in the king's palace. It is so contrived, that the one ascending and the other descending, shall never meet. Dr. Grew describes a model of this kind of stair-case kept in the Museum of the royal society. The foot of one of the stair-cases, he says, is opposite to that of the other, and both make a parallel ascent, and within the same cylinder: the newel in the middle is hollow, and built with long apertures, to convey light from candles placed at bottom, and at the sides of the newel, in both cases. 7. Quadruple winding-stairs. Palladio mentions a stair-case of this form in the castle of Chambor, near Blois. It consists of four stair-cases, carried up together, having each its several entrance, and going up one over another in such a manner as that being in the middle of the building, the four serve to lead to four apartments, so that the people of the one need not go up and down the stairs of the other, yet being open in the middle, they all see each other pass.

Thirdly, mixed-stairs are such as partly fly and partly wind; whence some call them fliers and winders. Of these there are several kinds: as, 1. Dog-legged-stairs, which first fly directly forwards, then wind a semi-circle, and then fly directly backwards parallel to that. 2. Square-fliers and winders have a square newel, either solid or open, and fly by the sides of the newel, winding a quadrant of a circle at each corner. 3. Solid and open newelled fliers and winders are of two kinds: the one winds the quadrant of a circle about a solid newel, then flies by the side of a square open newel, then winds again by the side of a solid newel, then flies again as before, and so alternately. The other flies first, then winds, then flies again, alternately.

The dimensions of stairs are differently assigned by different authors; but however they agree in this, that they must not be more than six, nor less than four inches high; nor more than eighteen, nor less than twelve inches broad; nor more than sixteen, nor less than six feet long,

long, each stair. But these measures regard only large and sumptuous buildings; for in common and ordinary houses they may be something higher and narrower, and much shorter; yet even in these the stairs are not to exceed seven, or at most eight inches in height, nor be less than nine or ten inches in breadth, nor three feet in length. To reduce the dimensions of stairs to some natural, or at least geometrical standard, Vitruvius borrows the proportion of the sides of a rectangled triangle, which the antient school expressed by the numbers 3, 4, and 5; the first for the perpendicular height, from the stair-head to the ground; the second for the horizontal breadth; and the third for the whole slope, or inclination, from the edge of one stair to that of another. But this rule is laid aside, and with good reason by the modern builders; for on this principle, the lower the stairs, the narrower they must be; and stairs, for instance, four inches high, such as we find mentioned by antient architects, must be but five inches and one third broad.

One rule to be regarded in the making of stairs, is, that they be laid somewhat sloping, or a little higher behind, that the foot may, as it were, both ascend and descend at the same time; which, though it is observed by few, is found a secret and delicate deception of the pains in mounting.

STAKE, the name of a small anvil, used by smiths; sometimes it stands on a broad iron-foot on the work-bench, to be moved up and down occasionally; and sometimes it hath a strong iron-spike at the bottom, by which it is fixed to some place on the work bench. Its use is to set small and cold work straight, by hammering it on the stake; or to cut or punch upon the cold chissel or cold punch.

STALACTITÆ, or **STALACTAGNIA**, **STONY ICICLES**, in natural history, crystalline spars formed into oblong, conical, round, or irregular bodies, composed of various crusts, and usually found hanging in form of icicles from the roofs of grottos, &c. See **SPAR**. Of this class there are various species, as the hard, white *stalaçtitæ*; the white, shattery *stalaçtitæ*; and the yellow, shattery, crystalline *stalaçtitæ*, &c.

STALACTOCIBDELA, in natural history, the name of a genus of spars, formed by the dropping of water from

the roofs of subterranean caverns; being the coarser kinds of what authors have called *stalaçtitæ*. These are crystallinoterrene spars, formed into oblong bodies, and found hanging from the roofs of caverns and grottos. See **SPAR**.

Of this genus there are only two known species. 1. A brownish, friable one, common in our subterranean caverns, and even on the insides of new-built stone-arches as those of the new bridge at Westminster. And, 2. A snow-white, friable one, found in subterranean caverns in England and Germany, and even on modern built brick-arches, as has of late been found on opening the vault under the terrace at Windsor. This, and the preceding instance, give us unquestionable evidence of the present, and daily formation of these bodies.

STALAGMITÆ. See the article **STALAGMOSCIERIA**.

STALAGMODIAUGIA, in natural history, the name of a genus of spars, being the purer kinds of what authors call *stalaçmitæ*, or drop-stones. See **SPAR**. These are spars found in form of small balls, each composed of numerous crusts, and considerably pellucid and crystalline. Of this genus there are three known species. 1. A white one, with numerous, thin crusts, and a smooth surface, found in many parts of Germany, and in England. 2. A greyish, white one, with thicker crusts, and a rougher surface. And, 3. A yellow, thin-crusted one, with an echinated surface. These are both found in the subterranean caverns of England, and many other places, and the former of them is the *confetti di tivoli* of the Italians.

STALAGMOSCIERIA, in natural history, the name of a genus of opaque spars, which have received their form from the dropping of water. See **SPAR**. The bodies of this genus are the coarser kinds of what are called by authors *stalaçmitæ*, and are small round masses, composed of numerous, thin crusts, and of an opaque and coarse structure. Of this genus we have only two known species. 1. A small, brownish, white one, with a smooth coat, found in Saxony, and some parts of England. And 2. A small, brownish, white one, with thin crusts, and a large nucleus. This is found in small masses in Yorkshire, and is the substance of which the famous Ketton-stone of Rutland is composed. Scotland affords a vast variety of the *stalaç-*

lagmitæ. One cave; about eight miles distant from Aberdeen, on the sea-side, has its whole roof crufted over with stalactitæ, of a foot in length, hanging down like the fringe of a bed. The floor also is as deep covered with congeries of stalagmitæ. The upper coat, both of these and the stalactites, is of a sea-colour, but the inner parts are as white as fal prunellæ. The water, which drops from these, is of a very peculiar nature; for it is so acrimonious, that if it touch the skin but ever so slightly, it makes it smart. Near this cave there is another hollow rock, in which the stalactitæ make a very beautiful figure: they are all formed into long and thick columns, and stand perpendicularly, so that they represent the pipes of an organ; when broken, they are all found to be hollow within. The rock, and all the stone thereabouts, is of the lime-stone kind.

STALBRIDGE, a market-town of Dorsetshire, situated eighteen miles north of Dorchester.

STALE, among sportsmen, a living fowl put in a place to allure and bring others where they may be taken. For want of these, a bird shot, his entrails taken out, and dried in an oven in his feathers, with a stick thrust through to keep it in a convenient posture, may serve as well as a live one.

Stale is also a name for the urine of cattle. See the article URINE.

STALIMENE, an island in the Archipelago, or Egean-sea.

STALK, in botany, that part of a plant which rises immediately from the root, and which supports the leaves of the flowers and the fruit.

The term stalk is used on all occasions; but in speaking of the grasses and gramineous plants, the word culm is used in its place, to distinguish that peculiar kind of stalk, which is general to all these plants, and is not found in any others.

STALKING, a term used in fowling, and applied to a kind of screen, or device, to hide the fowler and amuse the game, while he gets within shot. Of such devices there are several kinds, viz. the stalking-hedge, being an artificial hedge two or three yards long, and about a yard and a half high, made with small wands, to be light, and portable, yet bushed out, like a real hedge, with stakes, to support it, while the fowler takes his aim. Stalking-horse is an old horse

trained up for the purpose, which will gently walk up and down, as you would have him, in water, &c. beneath whose fore-shoulder the sportsman shelters himself and gun. When thus got within shot he takes aim from before the fore-part of the horse, which is much better than shooting under his belly. For change, when the fowls become so used to the stalking-horse as to know it, some stalk with an ox, cow, deer, or the like: others use a stalking tree, and others a stalking-bush.

STALLION, or **STONE-HORSE,** in the manage, an ungett horse, designed for the covering of mares, in order to propagate the species. See MARE.

In the choice of stallions for mares, care should be taken that they have no natural blemish of any kind whatever, such as moon-eyes, watery eyes, splint, spavins, curbs, &c. because, in that case, the colts will have the defect hereditary from the parent. On the other hand, the stallion should be chose able, high-spirited, fair-coloured, and fine-shaped. As to his age, he should not be younger to cover a mare than four years, nor older than twenty. Let the stallion be so highly fed as to be full of lust and vigour: and being brought to the place where the mares are, take off his hinder shoes, and let him cover a mare in hand twice or thrice, to keep him sober; then pull off his bridle and turn him loose to the rest of the mares, which should be in a convenient close, with strong fences and good food, and there leave him till he has covered them all, so that they will bear him no longer; by which time his courage will be pretty well cooled. Ten or twelve mares are enough for one stallion, in one and the same year. It will be necessary to leave a little shade, or hovel, for him in the field, to which he may retreat from the rain, wind, or sun. In this shade there should be a rack and manger, to feed him during his covering time. After he has done with the mares he should be removed to fresh pasture. For the further ordering of a stallion, before he is to cover, the following instructions are of use. Feed him for three or four months before covering, with good oats, pease, or beans, or with coarse bread and a little hays, but a good deal of wheat-straw; carrying him twice a-day to water; walking him up and down, for an hour, before he has drank, but without making him sweat.

STAMFORD,

STAMFORD, a borough-town of Lincolnshire, situated thirty-five miles south of Lincoln.

It sends two members to parliament.

STAMINA, according to most botanists, are the male organs of generation in flowers, consisting of two parts, a filament and anthera, though sometimes the anthera stands alone. See the articles **ANTHERÆ** and **FILAMENTS**.

Mr. Tournefort takes the use of the stamina to be as it were so many excretory canals for discharging the growing embryo of its redundant juices; and of these excrements of the fruit, he takes that farina, or dust, found in the apices, to be formed. But other writers, as Geoffroy, and Linnæus in particular, assign the stamina a nobler use: these authors, explaining the generation of plants, in a manner analogous to that of animals, maintain the use of the stamina to be that of secreting, in their fine capillary canals, a juice, which being collected, hardened, and formed into a farina, or dust, in the tips of the apices, is thence, when the plant arrives at maturity, discharged by the bursting of the apices upon the top of the pistil, whence is a passage for it to descend into the uterus, where being received, it impregnates and fecundifies the plant. See the articles **BOTANY**, **GENERATION of plants**, **FARINA**, **FOECUNDANS**, and **PISTIL**.

On this principle it may be said, that the same flower contains both sexes, which contribute each their part to the generation; that the stamina are the male part, and the farina, which is always found of an oily glutinous nature, the seminal liquor; and that the pistil is the female part, which conducts the semen to the ova or embryos. Among the writers of the present age, who oppose this doctrine, is Dr. Alston, professor of botany at Edinburgh, who, in an express dissertation on the sexes of plants, published in the *Physical Essays*, undertakes to overthrow all the arguments in favour of the sexes of plants, by repeated experiments. This learned author, considering that there are several species of vegetables which bear flowers on one plant and seeds on another, as *spinacia mercurialis*, *cannabis*, &c. in order to determine the controversy, thought of training up one or more of these seed-bearing plants at a sufficient distance from those that carry flowers, and observing the consequence. To this end, in spring 1737, he transplanted three sets of

the common spinage, long before it could be known whether they were flowering or seed-bearing plants, from a little bed, on which it was raised, into a place of the garden full eighty yards distant; and almost directly south, there being two Hawthorn and three holy-hedges, all pretty thick and tall, between them and their seed-bed, and no other spinage in the garden, nor so near them by far; all the three, we are told, proved fertile plants, and ripened plenty of seeds; and further, they were sown, grew, and prospered as well as any spinage could do.

The same author, in spring 1741, made other separate experiments on the common hemp, and the french mercury; each of which plants, notwithstanding they were planted in a very high inclosure, many hundred yards distant from any other of the same class of plants, he assures us, ripened fertile seeds.

For the arguments and experiments of the sexualists, or those who established the classes of plants upon the differences of the sexes and parts of fructification in plants, see the article **GENERATION**.

STAMINA, in the animal body, are defined to be these simple original parts, which existed first in the embryo, or even in the seed; and by whose distinction, augmentation, and accretion, by additional juices, the animal body, at its utmost bulk, is supposed to be formed. See **GENERATION**.

STAMINEOUS, in botany, a term used by authors, for those flowers of plants which have no petals, or flower leaves, but consist only of a number of stamina and pistils, placed in a cup. This cup is sometimes mistaken for a flower, and its leaves thought to be true petals, but they remain when the stamina are fallen, and become the capsules, containing the seed; which, according to Tournefort, is the true character of a cup, not of a flower.

STAMP-DUTIES, certain impositions laid on all parchment and paper, on which deeds, grants, or other instruments, or any process in law or equity, are ingrossed or written. These duties when first granted were from forty shillings for letters patent, &c. to six pence for the usual deeds; and one penny for declarations, pleadings, &c. They have been, in general, doubled and trebled, by subsequent statutes; and the common stamp now is the treble six-penny. Persons writing or engrossing any thing charged with the duty on parchment or paper, before it is stamped, or if it be marked

with any lower duty than what is required; are liable to forfeit 5*l.* and the deed shall not be deemed good in law, till such penalty is paid, and the same be stamped, &c.

The stamp-duties are also extended to almanacs, news-papers, pamphlets, cards, and dice. Almanacs printed on one side of a sheet, must be on a penny-stamp; and the first sheet of book-almanacs on a two penny-stamp, under a penalty of 10*l.* News-papers printed on a half-sheet, are charged with $\frac{1}{2}$ d. stamp; or if upon a whole sheet, 1 d. All pamphlets above a sheet, and under six sheets in octavo, twelve in quarto, or twenty in folio, are subject to a stamp-duty of 2 s. per sheet, which is to be paid within six days, if printed within the bills of mortality, or within fourteen days if printed at a greater distance, on penalty of 20*l.* and the loss of the property of the copy. But the votes of the house of commons, public prayers or thanksgivings, printed by authority, and sermons, are exempted. Cards pay a duty of 6 d. each pack: and the penalty for exposing cards to sale, not having one card stamped, is 5*l.* or not inclosed in paper and thread, sealed and stamped 10*l.* Dice pays 5 s. a pair stamp-duty; the person exposing unstamped dice to sale, forfeits 5*l.* for each dice: and whoever files, squares, or new-spots dice that have been played with, forfeits 10*l.*

STAMPS, in metallurgy, a sort of large pottles, lifted up by water-wheels, and serving to beat to powder the ores, and the refuse of ores, of metals. This engine is called the stamping-mill, and sometimes the knocking mill. See **MILL**.

STAMPALIA, an island of the Archipelago, about fifty miles in circumference, situated in east long. 26° 30', and north lat. 36° 20'.

STANCHEON. See **PUNCHEON**.

STANCHION, or **STANCHIONS**, in a ship, those pillars, which being set up pillar-wise, do support and strengthen the waste-trees.

STAND, in commerce, a weight, from two hundred and a half to three hundred, of pitch.

Stable STAND. See **STABLE-STAND**.

STANDARD, in war, a sort of banner, or flag, borne as a signal for the joining together of the several troops belonging to the same body. See **FLAG**, &c.

The standard is usually a piece of silk, a foot and a half square, on which are

embroidered the arms, device, or cypher of the prince, or of the colonel: it is fixed on a lance, eight or nine feet long and is carried in the center of the first rank of a squadron of horse.

The standard is used for any martial ensign of horse, but more particularly for that of the general, or the royal standard: those borne by the foot are rather called colours.

STANDARD, in commerce, the original of a weight, measure, or coin, committed to the keeping of a magistrate, or deposited in some public place, to regulate, adjust, and try the weights used by particular persons in traffic. See the article **COIN**, **MEASURE**, &c.

The justness of weights and measures is of that importance to the security and good order of trade, that there is no civilized nation, but makes it a part of their policy, to preserve the equality thereof, by means of standards. The standard of weights and measures in England are appointed by magna charta to be kept in the exchequer, by a special officer, called the clerk or comptroller of the market. See the article **CLERK of the market**.

The standard of gold-coin is twenty-two carats of fine gold and two carats of alloy in the pound weight troy: and the french, spanish, and spanish gold are nearly of the same fineness. The pound weight is cut into forty-four parts and a half, each current for twenty one shillings. The standard of silver is eleven ounces and two penny-weights of silver, and eighteen penny-weights of alloy of copper. Whether gold or silver be above or below standard, is found by assaying and the hydrostatical balance. See the articles **ASSAYING** and **HYDROSTATICAL BALLANCE**.

STANDARDS, or **STANDELS**, in husbandry, are young trees, reserved at the felling of woods, for the growth of timber.

STANDING, in the sea-language. Standing part of the sheet, is that part of which is made fast to a ring at the ship's quarter. Standing part of a tackle, is the end of the rope where the block is fastened. Standing ropes, are those which do not run in any block, but are set taut or let slack, as occasion serves; as the sheet-stays, back-stays, or the like.

STANDON, a town of Hertfordshire, situated under the meridian of London and seven miles north of Herford.

STANHOPE, a market-town of Durham, situated sixteen miles west of Durham.

STANLEY

STANLEY, a town of Gloucestershire, situated twelve miles south of Gloucester.

STANNARIES, the mines and works where tin is dug and purified, as in Cornwall, Devonshire, &c. There are four courts of the stannaries in Devonshire, and as many in Cornwall, and great liberties were granted them by several acts of parliament, in the time of Edward I. &c. though somewhat abridged under Edward III. and Charles I.

STANNUM, TIN, in fossil history, see the article **TIN**.

STANTON, a town of Lincolnshire, situated seventeen miles east of Lincoln, under the meridian of London.

STANTS, a town of Switzerland, capital of the canton of Underwald, situated on the lake of Lucern, twenty-five miles south of Zurich.

STANZA, in poetry, a certain stated number of verses, generally containing a perfect sense, that ought to end with some lively and ingenious thought, or just and pertinent reflection.

The word is italian, and literally signifies a stand, or station, because of the pause to be made at the end of each stanza, or complete sense. What the couplet is in songs, and the strophe in odes, the stanza is in the greater and graver pieces. The Italians, indeed, scarce write any poems, but they divide them into stanzas. There are stanzas of four, six, eight, ten, and twelve verses; and sometimes of an uneven number, but these last are somewhat more difficult to execute, by reason of the three verses to one rhyme.

The use of stanzas in tragedy and comedy is condemned by all the best critics; for though we speak verse on the stage, it is presumed we are speaking prose. Stanzas shew a degree of ingenuity on the part of the poet, which has nothing of nature in it on the part of the actor: add to this, that stanzas are not fit to express but a few of the passions.

STAPELIA, in botany, a genus of the pentandria-digynia class of plants, the corolla whereof consists of a large, plane, single petal, quinquefid beyond the middle; the fruit consists of two oblong subulated follicles, made up of only one valve, and containing one cell; the seeds are numerous, imbricated, compressed, and pappose.

STAPES, in anatomy, one of the ossicula auditoria, being a little bone situated in the cavity of the fenestra ovalis: thus called from its resembling a stirrup. See **EAR**.

The head of this bone is joined to the longer leg of the incus; its basis stands in the fenestra ovalis of the labyrinth of the ear; and its two lateral parts have their internal surface furrowed; the head is articulated by arthrodia with the leg of the incus. See the article **INCUS**.

STAPHYLÆA, BLADDER-NUT, in botany, a genus of the pentandria-trigynia class of plants, the corolla of which consists of five oblong erect petals, of the length of the cup; the fruit is composed of three inflated flaccid capsules, affixed together longitudinally, by a suture, pointed at the tops, and opening on the insides; the seeds are two, osseous, subglobose, with oblique points, and an orbicular hole at the side of the apex.

STAPHYLINUS, in zoology, a genus of insects, the antennæ of which are slender and filiform; there are two vesicles, situated above the tail; the exterior wings are demitiated and short, the interior ones are covered by them.

STAPHYLOMA, in surgery, the name of a distemperature of the eye, which is of two kinds: in one the cornea is more than usually protuberant; and in the other, the uvea breaks forth, and forms an unsightly tumour on the cornea, either from internal causes, or from some wounding instrument forced through the coat; in which last case, the sight of the eye is usually destroyed. This is a very dangerous disorder, as it not only deforms the face, and destroys the sight of the eye, but very often it induces violent inflammations, head-achs, restlessness, abscesses, and sometimes a cancer in those parts. In the cure of this disorder, the tumour and deformity are to be relieved, according to Heister, by the application of compresses dipped in alum-water, together with a plate of lead and a bandage, or some proper instrument. If the uvea protrudes itself thro' a wound in the cornea, it should be returned with a probe: the patient must be ordered to lie in a supine posture; and the wound must constantly be dressed with the white of an egg, and a mucilage of quince-seeds, till it is healed; by this means the sight is often restored.

If this disorder is become inveterate and inflexible to all remedies, a needle, armed with a double thread, must be passed through the middle of the tumour, and the two ends of the thread are then to be tied on a knot, first on one side, and then

on the other, by which means the tumour will gradually wither, and fall off along with the threads; but as this method occasions a continued pain, and from thence sometimes arise inflammations, it is better still to cut off the tumour with a scalpel, or scissors.

STAPLE primarily signifies a public place or market, whither merchants, &c. are obliged to bring their goods to be bought by the people, as the Greve, or the places along the Seine, for sale of wines and corn, at Paris, whether the merchants of other parts are obliged to bring those commodities.

Formerly the merchants of England were obliged to carry their wool, cloth, lead, and other like staple-commodities of this realm, in order to utter the same by wholesale; and these staples were appointed to be constantly kept at York, Lincoln, Newcastle upon Tyne, Norwich, Westminster, Canterbury, Chichester, Winchester, Exeter, and Bristol; in each whereof a public mart was appointed to be kept, and each of them had a court of the mayor of the staple, for deciding differences, held according to the law-merchant, in a summary way.

The staple-commodities of this kingdom are said by some to be these, *viz.* wool, leather, wool-fells, lead, tin, butter, cheese, cloth, &c. but others allow only the first five to be staple-commodities.

Staple signifies also a city or town, where the merchants jointly agree to carry certain commodities. The principal staples at present are Amsterdam, for all goods from the East-indies, Spain, the Mediterranean, and the Baltic; Flushing, for those of the West-indies; Middleburgh, for french wines; Dort, for rhenish wines and english cloth; Verre, in Zealand, for scotch merchandizes, &c. The staples in the Levant, are such cities where the English, French, Dutch, Italians, &c. have consuls, factors, and magazines; and whither they send vessels regularly every year. See **FACTORY**, **FAIR**, &c.

STAR, *stella*, in astronomy, a general name for all the heavenly bodies, which, like so many brilliant studs, are dispersed throughout the whole heavens.

The stars are distinguished, from the phenomena of their motion, &c. into fixed, and erratic or wandering stars: these last are again distinguished into the greater luminaries, *viz.* the sun and moon; the planets, or wandering stars, properly so called; and the comets; each

whereof has been fully considered and explained under their respective articles **SUN**, **MOON**, **PLANET**, and **COMET**. As to the fixed stars, or simply stars, they are so called because they seem to be fixed, or perfectly at rest, and consequently appear always at the same distance from each other.

Distribution and number of the fixed STARS.

An observer will first divide these stars into several classes, according to the splendor of their light; the brightest he will call stars of the first magnitude; those of the next inferior light, he will call stars of the second magnitude; and so in order to those which can barely be seen by the naked eye, which are called stars of the sixth magnitude: and those which cannot be seen but by the help of magnifying glasses, are of the seventh, eighth, &c. magnitudes. Afterwards, to avoid confusion, and to be able to point out any one star, without being obliged to give a particular name to each, he will divide them into separate parcels, of which he will make a particular plan; and to each of these constellations, or parcels of stars, he will assign a figure at pleasure, as that of a ram, a bull, a dragon, a Hercules, &c. but so that all the stars in each of the parcels, drawn in the plan, may be enclosed in the designed figures, and correspond to the different parts from whence they take their name: for example, having drawn the figure of a bull about a parcel, or constellation, of stars, that star which falls in the eye will be called the star in the bull's eye, or simply, the bull's eye; another, which respects the tip of one horn, will be named the bull's horn; and so of others. A parcel of stars thus contained in any assigned figure, is called a constellation. See **CONSTELLATION**. By this means notwithstanding the seeming impossibility of numbering the fixed stars, their relative situations one to another have been so carefully observed by astronomers, that they have not only been able to number them, but even to distinguish the place of each star in the heavens, and that with greater accuracy than any geographer could ever point out the situations of the several cities or towns upon the surface of the earth; and not only the places of those few, if they may be so called, which are to be seen with the naked eye, have been pointed out and registered by them, but even of those which are discovered only by the telescope. The most antient observations of the stars, which



Fig. 2. SURMOUNTED.



Fig. 1. Aberration of the STARS.

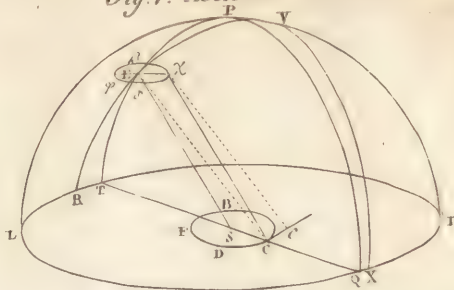


Fig. 3. STAR-FISH.

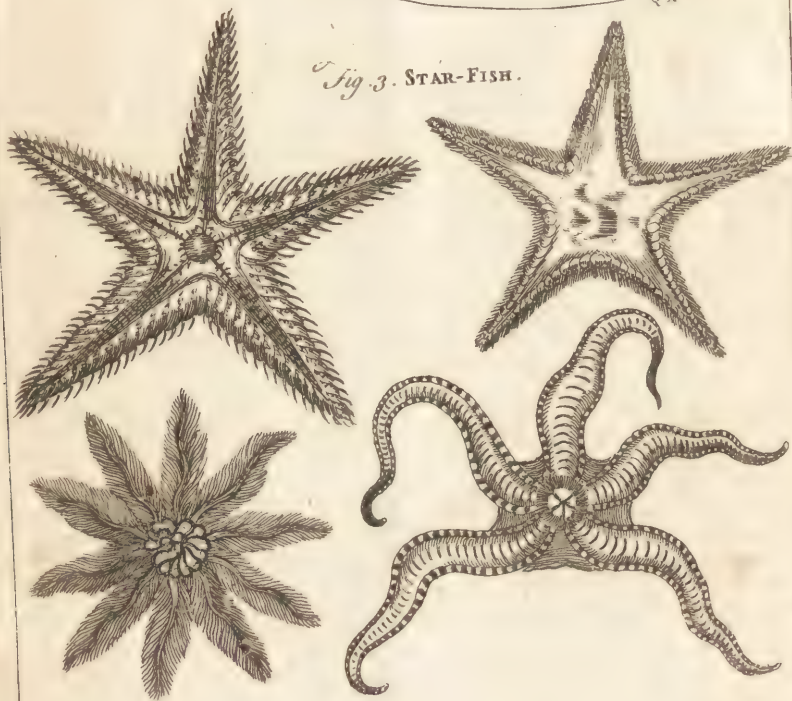


Fig. 4. STAR-STONES.



which have reached these times, were made by Timocharis and Ariftilius, about 300 years before Christ. The next after them, who made a catalogue of the stars visible to the naked eye, and registered their places, was Hipparchus of Rhodes; he flourished about 120 years before Christ, and numbered 1022 stars. After him, Ptolemy enlarged his catalogue to 1026: Ulug Beigh, the grand-father of Tamerlane the great, about the year 1437, constructed a new catalogue, more exact than that of Ptolemy, containing 1017 stars: Tycho, in the year 1600, determined the places of 777 fixed stars, and reduced them to a catalogue: Kepler's catalogue contained 1163 stars; and that of the prince of Hesse, 400: Ricciolus enlarged Kepler's catalogue to 1468; and John Bayer, a German, had described the places of 1725 stars: after this, about 1670, Hevelius of Dantzick, composed a catalogue of 1888 fixed stars: Dr. Halley also undertook a voyage to the island of St. Helena, in order to take the position of the stars within the antarctic circle, of which he published a catalogue, containing 373 stars: but the largest and most complete catalogue ever yet published, is that of our accurate astronomer Mr. Flamsteed, in his *Celestial History*, which contains near 3000 stars; all whose places are more exactly determined in the heavens, than the position of cities and other places on the earth.

We ought not, however, to imagine, that all the fixed stars are thus numbered, and reduced to their respective places in the heavens; since their number continually increases, according to the goodness of the telescope, appearing millions beyond millions, till, by their immense distance, they evade the sight, even tho' assisted by the best instruments. The telescopic stars with which Mr. Flamsteed has enriched his catalogue, are only the more remarkable ones, whose longitudes and latitudes, or situations in the heavens, it was thought worth while to register and put down. Dr. Hook, with a telescope of twelve feet, saw 78 stars among the pleiades; and with a longer telescope, still more: and, in the single constellation of orion, which in Mr. Flamsteed's catalogue, has but 80 stars, there have been seen 2000. We may, therefore, venture to pronounce the number of fixed stars, including the telescopic ones as well as those visible to the naked

eye, to be infinitely great, far beyond what it is possible for the best astronomers to calculate, much less to reduce to order. But though the stars are certainly innumerable, yet those visible to the naked eye, in one hemisphere, seldom exceed a thousand; which, perhaps, may appear strange, since, at first sight, their number seems immensely great; but this is only a deception of sight, arising from a confused and transient view; for let a person single out a small portion of the heavens, and after some attention to the situation of the more remarkable stars therein, begin to count, he will soon be surpris'd to find how few there are therein. However, even the number of stars visible to the naked eye, small as it is in comparison with that of the telescopic ones, is far from being constant; since, besides that the different states of the atmosphere renders many of the lesser stars invisible, some stars have been observed to appear and disappear by turns; particularly one in the chair Cassiopeia, in the year 1572, which, for some time, outshone the biggest of the fixed stars, and in sixteen months time, by degrees, vanished quite away, and was never seen since: in the year 1640, the scholars of Kepler saw a star in the right leg of serpens, which likewise gradually disappeared: Fabricius, in the year 1596, gives the first account of the *stella mira*, or wonderful star, in the neck of the whale; which has been since found to appear and disappear periodically, its period being seven revolutions in six years, but is never quite extinguished. Several other new stars have been observed: as one by Hevelius, in 1670., and another by Mr. Kirch, in 1689. These new stars are generally observed in the galaxy, or milky way, See the article *GALAXY*. As to the causes of this appearing and disappearing of the fixed stars, Sir Isaac Newton conjectures, that as it is possible our sun may sometimes receive an addition of fuel by the falling of a comet into it; so the sudden appearance of some stars, which formerly were not visible to us, may be owing to the falling of a comet upon them, and occasioning an uncommon blaze and splendor for some time: but that such as appear and disappear periodically, and increase by very slow degrees, seldom exceeding the stars of the third magnitude, may be such as having large portions of their surfaces obscured by spots, may, by revolving round

round their axis, like the sun, expose their lighter and darker parts to us successively.

Nature and distance of the fixed STARS.

From the similitude there appears to be between them and the sun, it is generally supposed by philosophers, that they are not placed in the heavens by way of ornament only, or to supply us with a faint light in the absence of the moon; but that each of them is placed in the midst of a system of planetary worlds, and that it directs their motions, and supplies them with light and heat, in the same manner that the sun does the several bodies of which our solar system is composed; in short, that they are so many suns, which no doubt have planets moving regularly round them, though invisible to us. That this is not mere hypothesis, will appear from the following arguments, drawn from the analogy they bear to our sun: the sun shines by its own native light, and so do the fixed stars: the sun, at the distance of the fixed stars, would appear no larger than a star; none of our planets, at that distance, could be seen at all: is it not probable, therefore, that each of the fixed stars is a fixed sun, surrounded by a system of planets and comets, which may be again furnished with different numbers of satellites, or moons, though invisible to us? Besides, as the number of stars is immensely great, dispersed through spaces of the universe, far beyond the reach of the best telescopes, and as God has made nothing in vain, it seems highly probable that they severally serve the purposes of light and heat for the planets of their systems; since nothing can be more absurd than to pretend that myriads of unseen stars were made to twinkle in the unknown regions of the universe.

That the fixed stars shine by their own light, is thus proved: when viewed thro' a telescope, they appear only as mere lucid points, destitute of all sensible magnitude, and consequently must be at a vast distance; because the satellites of jupiter and saturn, when viewed through a telescope, appear of very distinguishable magnitudes, and yet are invisible to the naked eye. Since, then, the fixed stars are at such a vast distance, that the best telescope has no power to magnify them, and nevertheless shine with a very bright and sparkling light, it is inferred that they must shine with their own proper and unborrowed light; because, if their light was only borrowed, they would,

like the satellites already mentioned, be invisible to the naked eye.

The celebrated Huygens found the brightest and largest, and consequently the nearest of the fixed stars, viz. sirius, or the dog-star, to be in appearance 27664 times less than the sun; and since the distances of objects are greater as their apparent magnitudes are lesser, the dog-star must be distant from our earth 200000000000, or above two millions of millions of english miles; which is so very great, that a cannon-ball continuing in the same velocity it acquires when immediately discharged at the mouth of the cannon, would spend almost seven hundred thousand years in passing thro' it; and it is very probable, that the fixed stars are equally distant from each other, as the nearest of them is from our sun; since, the better the telescopes we make use of, the more stars are seen. Hence it is very natural to conclude, that all the fixed stars are not placed at equal distances from us: but that they are every where interspersed, at great distances beyond one another, throughout the universe; and that, probably, the different appearances which they make, in point of splendor and magnitude, may be rather owing to their various distances from us, than to any real difference in their magnitudes.

From what has been said, concerning the number, nature, and distance of the fixed stars, the hypothesis of a plurality of worlds, wherein each fixed star serves as a sun to a system of planets, seems rational, worthy a philosopher, and greatly displays the wisdom, and redounds to the glory of the great creator and governor of the universe.

Apparent motions of the fixed STARS. Since the fixed stars remain immoveable, whatever is said of their motions, must be understood of their apparent motions only; and of these astronomers reckon four kinds.

I. The first, and indeed the most obvious, apparent motion of the stars, is that from east to west; which, being entirely owing to the diurnal rotation of the earth round its axis, has been already explained under the articles EARTH and DIURNAL.

II. The second apparent motion of the fixed stars, arising from the precession of the equinoxes, is very small, not exceeding 50" in a year, or 1° in 70 years; and, therefore, to complete one revolution of a circle, it requires no less than

25920 years, after which period the stars all return to their former places: this motion has also been accounted for, under PRECESSION and PLATONIC YEAR.

III. The third apparent motion of the stars, is owing to what is called the aberration of light; the discovery of which we owe to our excellent astronomer Dr. Bradley, who, being desirous to discover the parallax of the earth's annual orbit, caused an instrument to be made by the late accurate Mr. Graham; and found, by many observations, that the bright star, γ , in the head of the constellation draco, appeared $39''$ more northerly in September than in March; just the reverse of what it ought to appear, by the annual parallax of the stars. This unexpected phenomenon perplexed the Doctor and Mr. Molyneux very much; and Mr. Molyneux died before the true cause of it was discovered. Afterwards, Dr. Bradley, with another instrument, more exact, and accurately adapted to this purpose, observed the same appearances, not only in that, but many other stars; and being fully satisfied, by many repeated trials; that the phenomenon was neither owing to any error in the instrument nor observation, applied himself to consider what might be the true cause of it; and after many reflections and hypotheses, which he still found insufficient, he at last discovered that it was really owing to the progressive motion of light, and the sensible proportion which the velocity thereof bore to the velocity of the annual motion of the earth.

This important discovery we shall now proceed to explain; and first, it is a known fact, by the observation of jupiter's satellites, that the light whereby objects become visible to us, employs a sensible time in coming from the object to the eye, when at a great distance from each other; this we have proved under the article LIGHT; where it is shewn, that a ray is about $8'$ in coming from the sun to the earth.

It is also certain, that the visibility of objects depends on the impression made on the eye by the luminous rays they transmit; also the figure and position of objects are judged of according to this impression, and therefore thought to be in the right line in whose direction they fall upon the eye. Hence, if the rays of light transmitted from objects arrive at the eye after having been reflected, re-

fracted, or, by any physical accident, turned from the first course, the objects are however, judged to be in the direction of those rays which enter the eye, and not in that of the rays immediately issuing from the object.

Now if the earth had no annual motion, a ray of light passing from a star with any finite velocity, and arriving at the eye without being turned off by any physical cause, would shew the star in its true situation, whatsoever time that ray might employ in coming from the star to the eye: and the same would happen though the earth was moveable, provided the velocity of light was infinite; for then the earth's motion would be inconsiderable, when compared with a velocity infinitely great. But when the velocity of light has a finite proportion to that of the earth, the impression of the ray on the eye is neither in the direction of the ray first transmitted, nor in that of the earth; but, like a body urged by two forces in different directions, the impression is made in the diagonal of a parallelogram, formed by the directions of the ray, and a tangent to the earth's orbit at the point where the earth is when the ray falls upon it, because the sides of this parallelogram are proportional to the velocities or spaces run through by the earth and ray, in the same time. So that the star's apparent place will be at the end of that diagonal, which falls on one side of the star's true place.

For example, let T L Q I (plate CCLX. fig. 1.) be an indefinitely great circle representing the ecliptic, with the sun at its center S; P its pole, C B F D the earth's orbit, Q P E T a circle of latitude passing through any star E, determining the longitude in T and latitude in T E. Let T Q be the intersection of the plane of this circle of latitude, with the plane of the ecliptic; and let the earth's place be first in C, when the star is in conjunction with the sun: then having joined C E; and drawn the tangent C c, which is perpendicular to the plane of the circle of latitude T P Q; C E is to C c, as the velocity of the ray of light is to the velocity of the earth in its orbit. Now it being known, that light is a little more than $8'$ of time in passing from the sun to the earth; also that the earth describes in its orbit an arc of $20''$ in that time, we have R: tang. $20''$: 1 C E = $8' 13''$: C c. Wherefore

fore Cc being thus determined, and the parallelogram $ECc\chi$ constructed, the point χ is the place in the heavens where the impression of the light will occasion the star to appear; and the celestial arc, $E\chi$, is called the star's aberration.

From a like construction made for every point of the earth's orbit, it follows, 1. That, supposing this orbit to be circular, and the velocities of light and the earth uniform, then all the apparent places of the same star must be in a circle, with the star's true place at its center, and whose plane is parallel to the ecliptic; consequently, the projection of this circle in the heavens is an ellipsis, whose greater axis is parallel to the plane of the ecliptic, its lesser axis perpendicular to that plane, and are in proportion as the radius to the sine of the star's latitude: and according to the nicest observations, the greater axis of the ellipsis of aberration subtends in the heavens an arc of $40''$ of a great circle. 2. The plane of a star's parallelogram of aberration changes its situation every instant; being determined by the star, and by the position of a tangent to every successive place of the earth in its orbit: it must therefore make a revolution in a year; and because of the almost infinite distance of the stars from the sun and the earth, the earth's orbit may be taken only as the point S , and the plane of the angle of aberration may be supposed to turn in the right line ES , drawn from the star to the sun, in the same manner as the earth moves about the sun. 3. The star's apparent motion in this ellipsis, must differ from that in the epicycle; for when the plane of the parallelogram of aberration is become perpendicular to the plane TPQ of the circle of latitude, which happens in the syzygy, because the tangent Cc is then perpendicular to that plane, the angle of aberration is not in the plane TPQ , nor is there then any aberration in latitude: but this angle is measured by the right line, $E\chi$, parallel to the ecliptic, and perpendicular to the plane TPQ , being half the greater axis of the ellipsis; and is therefore the arc of a small circle, parallel to the ecliptic, and passing through the star's true place; the whole aberration being then in longitude, and at its greatest. But when the plane of the angle of aberration co-incides with the plane TPQ , which happens when the earth

has run through 90° from the syzygy, and consequently where the star is in quadrature with the sun, the angle of aberration is wholly in latitude; and the star being at the extremity of the lesser axis of its ellipse, the aberration in latitude is there greatest, and nothing in longitude. In other positions of the plane of this angle, the aberration is divided partly in longitude, and partly in latitude, much like a force oblique to a plane; all which is just the reverse of what it should be, by the parallax of the annual orbit; since, according to it, the parallax in longitude is greatest in the quadratures, and nothing in the syzygies; and the parallax in latitude is greatest in the syzygies, and nothing in the quadratures. Moreover, if a circle of declination, RVX , be conceived to pass through the star E , consequently crossing its ellipsis of aberration by passing through the center; it is evident, that, when a star appears at the points where that circle intersects the ellipsis, it will appear to have no aberration in right ascension, because its true and apparent place will be in the same circle of declination: and when the star is in the points where its ellipsis is cut by a diameter perpendicular to the circle RVX , it will have no aberration in declination, because its true and apparent place will be in the same parallel to the equator. But all circles of declination being oblique to the ecliptic, except the solstitial colure, the star does not pass from the term of no aberration in right ascension, to that of no aberration in declination, in the time the earth takes to describe 90° of its orbit; consequently, when the aberration is greatest in right ascension, it is not absolutely nothing in declination, and reciprocally.

Lastly, to calculate the effect of the aberration of light on the planets, say; as the horary motion of the sun multiplied by the radius of the annual orbit of the earth, is to the distance of the earth from the planet multiplied by $20''$; so is the horary motion of the planet, in longitude, in latitude, in right ascension, or in declination, to a quantity whereby the aberration of light has diminished this longitude, this latitude, this right ascension, or this declination. The demonstration of this analogy may be found in the Memoirs of the Academy of Sciences at Paris, for the year 1746; and those who

desire

desire farther information on this subject, may consult the said Memoirs for 1737, the Philos. Trans. n° 485, and La Caille's Elem. Astron. §. 177, seq.

IV. The fourth apparent motion of the fixed stars is that arising from the nutation of the earth's axis; a discovery we also owe to doctor Bradley, who observed a greater declination in some of the fixed stars, lying nearly opposite in right ascension, than the precession of the equinoctial points would have occasioned, and such as a nutation or libratory motion of the earth's axis would effect. The quantity of this nutation, as collected from the doctor's observations, is 18"; which is equal to the diameter of the little circle, wherein the pole of the equator moves: but for the application of this theory to the practice of astronomy, in solving the various phenomena of the fixed stars, we must refer to the above-mentioned books; and shall only observe, that the corrections arising from the aberrations of light, as well as from the nutation of the earth's axis, must not be neglected in astronomical observations, since such neglects may produce errors of near a minute in the polar distances of some stars. As to the causes of the nutation of the earth's axis, the doctor thinks some part of it at least, if not the whole, is owing to the moon's action upon the equatorial parts of the earth; which, he conceived, might cause a libratory motion of the earth's axis. But as he was unable to judge, from only nine years observation, whether the axis would entirely recover the same position that it had in the year 1727, he found it necessary to continue his observations through a whole period of the moon's nodes; at the end of which he had the satisfaction to see, that the stars returned into the same positions again, as if there had been no alteration at all in the inclination of the earth's axis: which fully convinced him that he had guessed rightly as to the cause of the phenomenon. This circumstance proves likewise, that if there be a gradual diminution of the obliquity of the ecliptic, it does not arise only from an alteration in the position of the earth's axis, but rather from some change in the plane of the ecliptic itself: because the stars, at the end of the period of the moon's nodes, appeared in the same places, with respect to the equator, as they

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ought to have done, if the earth's axis had retained the same inclination to an invariable plane.

Falling STARS, stellæ cadentes, in meteorology, fiery meteors, which dart thro' the sky, in form of a star; being occasioned by a nitro-sulphureous matter, the common cause of all such meteors. See the article AURORA BOREALIS.

STAR, in heraldry, a charge frequently borne on the shield, and the honourable ordinaries, in figure of a star; which differs only from the mullet, in not being pierced as this last is. See MULLET.

STAR is also a badge of honour, worn by the knights of the garter, bath, and thistle. See the article GARTER.

STAR, in pyrotechny, a composition of combustible matters, which, being thrown aloft in the air, exhibits the appearance of a real star.

Stars are chiefly used as appendages to rockets, a number of them being usually inclosed in a conical cap or cover, at the head of the rocket, and carried up with it to its utmost altitude, where the stars, taking fire, are spread around, and exhibit an agreeable spectacle. See the article ROCKET.

To make stars, mix three pounds of saltpetre, eleven ounces of sulphur, one of antimony, and three of gun-powder dust: or twelve ounces of sulphur, six of saltpetre, five and an half of gun-powder dust, four ounces of oilbanum, one of mastic, camphire, sublimate of mercury, and half a one of antimony and orpiment. Moisten the mass with gum water, and make it into little balls of the size of a chestnut, which dry either in the sun or the oven. These, set on fire in the air, will represent stars.

STAR-APPLE, *chrysophyllum*, in botany. See the article CHRYSOPHYLLUM.

STAR of Bethlehem, *ornithogalum*, in botany. See the article ORNITHOGALUM.

STAR-BOARD, in the sea-language, denotes the right-hand side of a ship: thus they say, star-board the helm, or helm a star-board, when he that commands would have the men at the helm, or steering-wheel, put the helm to the right-side of the ship.

STAR-CHAMBER, a chamber at Westminster, so called from having its roof painted with gilt stars, wherein the chancellor, assisted by others, appointed for that purpose, formerly had authority to punish routs, riots, and other misdemeanors, that were not by the common

law provided against. See the article CHAMBER.

STAR-FISH, *asterias*, or *stella marina*, in zoology, a genus of naked insects, in the form of a radiated star; the mouth is situated in the center, on the under part; and the anus in the center, on the upper part: the tentacula are extremely numerous, and in a manner cover, either the whole upper surface of the body, or the extremities of the ramifications.

The species of this genus, being very numerous, are distinguished according to the number of their rays; they are also of different sizes; the largest, or great magellanic star fish, forming a circle of three feet in diameter, when its rays are fully extended, others not exceeding an inch in diameter. See plate CCLX. fig. 3. where four of the lesser ones are represented.

STAR-FORT, or **REDOUBT**, in fortification. See the articles **FORT** and **REDOUBT**.

STAR-GAZER, in ichthyology, the english name of the *uranoscopus*. See the article **URANOSCOPUS**.

STAR-SHOT, a gelatinous substance frequently found in fields, and supposed by the vulgar, to have been produced from the meteor, called a falling star: but, in reality, is the half digested food of herons, sea-mews, and the like birds; for these birds, when shot, have been found when dying, to disgorge a substance of the same kind.

STAR-STONE, *asteria*, in natural history, a name given to certain extraneous fossil stones, in form of short, and commonly somewhat crooked, columns, composed of several joints; each resembling the figure of a radiated star, with a greater or smaller number of rays in the different species: they are usually found of about an inch in length, and of the thickness of a goose-quill. Some of them have five angles, or rays, and others only four, and in some the angles are equidistant, while in others they are irregularly so; in some also they are short and blunt, while in others they are long, narrow, and pointed; and some have their angles so very short and obtuse, that at first sight they might be taken for *entrochoasteria*. The several joints in the same specimen are usually all of the same thickness; this however is not always the case, but in some they are larger at one end, and in others at the middle, than in any other part of the

body; and some species have one of the rays bifid, so as to emulate the appearance of a six-rayed kind. See plate CCLX. fig. 4. where several sorts of them are represented.

STAR-THISTLE, the english name of a species of *centaurea*, called by some *calci-trapa*. See the article **CENTAUREA**.

STAR-WORT, *aster*, in botany. See the article **ASTER**.

STARCH, a fecula, or sediment, found at the bottom of vessels wherein wheat has been steeped in water, of which fecula, after separating the bran from it, by passing it through sieves, they form a kind of loaves, which being dried in the sun or an oven, is afterwards cut into little pieces, and so sold. The best starch is white, soft, and friable, and easily broken into powder. Such as require fine starch do not content themselves, like the starch-men, with refuse wheat, but use the finest grain. The process is as follows: The grain being well cleaned is put to ferment in vessels full of water, which they expose to the sun while in its greatest heat, changing the water twice a day, for the space of eight or twelve days, according to the season. When the grain bursts easily under the finger, they judge it sufficiently fermented. The fermentation perfected, and the grain thus softened, it is put, handful by handful, into a canvas bag, to separate the flour from the husks, which is done by rubbing and beating it on a plank laid across the mouth of an empty vessel that is to receive the flour.

As the vessels are filled with this liquid flour, there is seen swimming at top redish water, which is to be carefully skimmed off from time to time, and clean water is to be put in its place, which, after stirring the whole together, is also to be strained through a cloth or sieve, and what is left behind put into the vessel with new water, and exposed to the sun for some time. As the sediment thickens at the bottom, they drain off the water four or five times, by inclining the vessel, but without passing it through the sieve. What remains at bottom is the starch, which they cut in pieces to get out, and leave it to dry in the sun. When dry it is laid up for use.

To use starch, they take as much as is needed, and steep it in water over night, changing the water four or five times. The starchmen using the refuse of wheat, only observe a part of these things in their

Fig. 1. The STARLING, Cock and Hen.



Fig. 2. STRABISMUS



Fig. 3. SUBTANGENT.

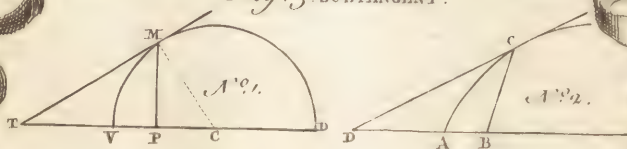


Fig. 4. The STURGEON.



Fig. 5. SWIMMING.



Fig. 6' SUBNORMAL



Fig. 7. SUBCONTRARY POSITION.

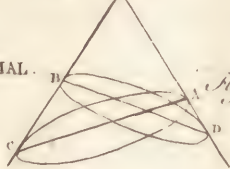
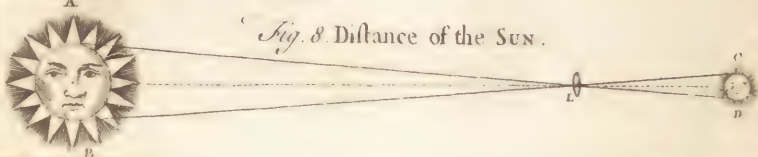


Fig. 8. Distance of the SUN.





their process, but their starch falls far short of this. Starch is used along with smalt, or blue stone, to stiffen and clear linen; the powder thereof is also used to whiten and powder the hair. It is also used by the dyers to dispose their stuffs to take colours the better.

Starch, the hundred weight, pays, on importation, three pounds, fifteen shillings, and four pence; and foreign starch draws back nothing upon exportation. By the 23d. Geo. II. Starch may not be imported in any package that shall not contain two hundred and twenty-four pounds of neat starch, at the least, under penalty of forfeiting the goods, and the master, or other person, taking charge of the vessel, to forfeit fifty pounds.

STARGARD, a town of Germany, in the circle of Upper-Saxony, and dutchy of Pomerania, situated twenty miles east of Stetin.

STARIA, a city of Russia, in the province of Great Novogorod, situated at the south end of the Ilmen-lake: east long. $34^{\circ} 2'$, north lat. 58° .

STARLING, *sturnus*, in ornithology, a distinct genus of birds of the order of the passerines, the characters of which are these: the beak is of a subulated figure, and depressed in an angulated manner, and obtuse at the extremity; the tongue is marginated and acute.

Of this genus there is only one known species, *viz.* the common starling, much about the size of the black-bird, only that it stands more erect, and the body is slenderer. Its general colour is black, variegated with grey spots, and the tips of the feathers of the neck and back are yellowish: the principal feathers of the wings and tail are brown, and have some yellow at their edges. The starling is frequent with us, and may be taught to imitate the human voice. See plate CCLXII. fig. 1. where n° 1. represents the cock, and n° 2. the hen.

STARTING, in the manege. A horse is said to be starting, skittish, or timorous, that takes every object he sees to be otherwise than it is: whence he frequently stops, flies out, and starts suddenly to one side, inasmuch that the rider cannot make him go forwards. This fault is more common to geldings than stone-horses, and these are most subject to it who have bad eyes, as well as those that have been kept long in a stable without airing; but these last are easily

cured of it. You should never beat a starting horse in his consternation, but get him to advance gently, and by fair means, to the object that alarms him.

START-POINT, a cape, or promontory, of Devonshire, in the english channel, twelve miles south of Dartmouth.

STATE, or **ESTATE**, an empire, kingdom, province, or extent of country under the same government. See the article **ESTATE**.

STATEN-ISLAND, an island of the province of New-York, in North America, situated near the mouth of Hudson's river, in west long. $72^{\circ} 31'$, north lat. 41° .

STATERA-ROMANA, or **STEEL-YARD**, a name given to the roman balance. See the article **BALANCE**.

STATES, or **ESTATES**, a term applied to several orders or classes of people assembled to consult of matters for the public good. See **ESTATE**.

Thus states-general is the name of an assembly consisting of the deputies of the seven united provinces: these are usually thirty in number, some provinces sending two, others more, and whatever resolution the states-general take, must be confirmed by every province, and by every city and republic in that province, before it has the force of a law. The deputies of each province, of what number soever they be, have only one voice, and are esteemed as but one person, the votes being given by provinces. Each province presides in the assembly in its turn, according to the order settled among them. Guelderland presides first, then Holland, &c. See the article **STADTHOLDER**.

States of Holland are the deputies of eighteen cities, and one representative of the nobility, constituting the states of the province of Holland: the other provinces have likewise their states, representing their sovereignty, deputies from which make what they call the states-general. In an assembly of the states of a particular province, one dissenting voice prevents their coming to any resolution.

STATHOLDER. See **STADTHOLDER**.

STATICE, **THRIFT**, or **COMMON SEALAVENDAR**, in botany, a genus of the pentandria pentagynia class of plants, the corolla whereof is infundibuliform, consisting of five petals, narrow at bottom, and broad, patent, and obtuse at the top: there is no pericarpium: the cup becomes constricted about the neck,

and its limb is expanded : and in this state it retains the seed, which is single, very small, and roundish.

STATICS, that branch of mathematics which considers the motion of bodies arising from gravity. See **MOTION**.

Statics then is the doctrine, or theory, of motion, considered merely as arising from the weight of bodies ; in which sense it is distinguished from mechanics, which is the application of statics to machines, engines, &c. though, it must be owned, that statics and mechanics are frequently confounded. See the article **MECHANICS**.

For the laws and principles whereon the doctrine of statics is founded, see the articles **GRAVITY**, **GRAVITATION**, **DESCENT**, &c.

STATICS, *statici*, in medicine, a kind of epileptics, or persons seized with an epileptic fit ; during which they contemplate some strong and lively idea, whereby they are distinguished from cataleptics, or persons seized with a catalepsy. See the articles **CATALEPSY** and **EPILEPSY**.

STATION, in geometry, surveying, &c. a place pitched upon to make an observation, take an angle, or the like. See **OBSERVATION**, **SURVEYING**, &c.

STATION, in the church of Rome, denotes certain churches where indulgences are to be had on certain days : thus we find in their calendar, Monday in Rogation week, station at St. Maria Maggiore's ; Tuesday, station at St. John Lateran's, and S. Maria Novella's ; and Wednesday, station at St. Peter's : and after the same manner, at other seasons of the year.

STATION is also used, in the same church, for the ceremony of the priest's, or canon's, going out of the choir to sing an anthem before the crucifix, or the image of our lady.

STATIONARY, in astronomy, signifies the appearance of a planet, when it seems to remain immovable on the same point of the zodiac for several days.

As the earth, whence we view the motions of the planets, is out of the center of their orbits, the planets appear to proceed irregularly ; being sometimes seen to go forwards, that is, from west to east, which is called the direction ; sometimes to go backwards, or from east to west, which is called the retrogradation. Now between these two states there must be an intermediate one, wherein the pla-

net neither appears to go backwards, nor forwards, but to stand still, and keep the same place in her orbit ; which is called her station : and this will happen, when the line that joins the earth's and planet's center is constantly directed to the same point in the heavens ; that is, when it keeps parallel to itself. For all right lines, drawn from any part of the earth's orbit, parallel to one another, do all point to the same star ; the distance of these lines being insensible, in comparison of that of the fixed stars.

Saturn is seen stationary at the distance of somewhat more than a quadrant from the sun ; jupiter at the distance of fifty-two degrees ; and mars at a much greater distance.

Saturn is stationary eight days, jupiter four, mars two, venus one and an half, and mercury an half, though the several stations are not always equal.

STATIONARY-DAYS, in church-history, an appellation given to the weekly fast-days, *viz.* Wednesdays and Fridays ; otherwise called half-fasts, and fasts of the fourth and sixth days of the week. See the article **FAST**.

These fasts are certainly as antient as Clemens Alexandrinus and Tertullian, who both mention them ; and the reason of their institution is, because on the fourth day of the week the Jews took council to put our Saviour to death, which was actually accomplished on the sixth : however, being in continual use throughout the year, they were not kept with such rigour and strictness as Lent. See the article **LENT**.

STATIONARY FEVER, a peculiar kind of fever, adapted, and owing, to some general constitution of the air and seasons. Sydenham observes, that there are certain general constitutions of years, which owe their origin neither to heat, cold, dryness, nor moisture, but rather depend upon a certain secret and inexplicable alteration in the bowels of the earth, whence the air becomes impregnated with such kinds of effluvia, as subject the human body to peculiar distempers, so long as that kind of constitution prevails, which after a certain course of years declines, and gives way to another. Each of these general constitutions is attended with its own proper and peculiar kind of fever, which never appears in any other ; and this is thence called a stationary-fever. See the article **FEVER**.

STATIVA,

STATIVA, among the Romans, a standing camp kept for the defence of the frontiers of the empire. These camps gave rise to a great many towns, which took their names from the legion stationed there.

STATUARY, *statuaria*, a branch of sculpture, employed in the making of statues. See the article **SCULPTURE**, and the next article.

Statuary is one of those arts wherein the ancients surpassed the moderns; and indeed it was much more popular, and more cultivated among the former than the latter. It is disputed between statuary and painting, which of the two is the most difficult and the most artful. Statuary is also used for the artificer who makes statues. Phidias was the greatest statuary among the ancients, and Michael Angelo among the moderns.

STATUE, *statua*, is defined to be a piece of sculpture in full relief, representing a human figure. Daviler more scientifically defines statue a representation, in high relief and insulate, of some person distinguished by his birth, merit, or great actions, placed as an ornament in a fine building, or exposed in a public place, to preserve the memory of his worth. In strictness, the term statue is only applied to figures on foot, the word being formed from *statua*, the size of the body.

Statues are formed with the chisel of several matters, as stone, marble, plaster, &c. They are also cast of various kinds of metal, particularly gold, silver, brass, and lead. For the method of casting statues, see **FOUNDERY of statues**.

Statues are usually distinguished into four general kinds: the first are those less than the life, of which kind we have several statues of great men, of kings, and of gods themselves; the second are those equal to the life, in which manner it was that the ancients, at the public expence, used to make statues of persons eminent for virtue, learning, or the services they had done: the third, those that exceed the life, among which, those which surpassed the life once and a half, were for kings and emperors, and those double the life, for heroes: the fourth kind were those that exceeded the life twice, thrice, and even more, and were called colossuses. See the article **COLOSSUS**.

Every statue, resembling the person it is intended to represent, is called *statua iconica*. Statues acquire various other de-

nominations. 1. Thus allegorical statue, is that which, under a human figure, or other symbol, represents something of another kind, as a part of the earth, a season, age, element, temperament, hour, &c. 2. Curule statues, are those which are represented in chariots drawn by bigæ, or quadrigæ, that is, by two, or four horses; of which kind there were several in the circuses, hippodromes, &c. or in cars, as we see some, with triumphal arches, on antique medals. 3. Equestrian statue, that which represents some illustrious person on horse-back, as that famous one of Marcus Aurelius, at Rome; that of king Charles the first, at Charing-Cross; king George the second, in Leicester-Square, &c. 4. Greek statue, denotes a figure that is naked and antique; it being in this manner the Greeks represented their deities, athletes of the olympic games, and heroes: the statues of heroes were particularly called achillean statues, by reason of the great number of figures of that prince in most of the cities of Greece. 5. Hydraulic statue, is any figure placed as an ornament of a fountain or grotto, or that does the office of a jet d'eau, a cock, spout, or the like, by any of its parts, or by any attribute it holds; the like is to be understood of any animal serving for the same use. 6. Pedestrian statue, a statue standing on foot; as that of king Charles the second in the Royal-Exchange; and of king James the second, in the Privy-Gardens. 7. Roman statue, is an appellation given to such as are clothed, and which receive various names from their various dresses. Those of emperors, with long gowns over their armour, were called *statue paludate*: those of captains and cavaliers, with coats of arms, *thoracate*: those of soldiers, with cuirasses, *loricate*: those of senators and augurs, *trabeate*: those of magistrates, with long robes, *togate*: those of the people, with a plain tunic, *tunicate*: and, lastly, those of women, with long trains, *solate*. The Romans had another division of statues into divine, which were those consecrated to the gods, as Jupiter, Mars, Apollo, &c. Heroes, which were those of the demi-gods, as Hercules, &c. and Augusti, which were those of the emperors, as those two of Cæsar and Augustus, under the portico of the capitol. In repairing a statue cast in a mould, they touch it up with a chisel, graver,

or other instrument, to finish the places which have not come well off: they also clear off the barb, and what is redundant in the joints and profeures.

STATURE, the size or height of a man.

STATUTE, *statutum*, in its general sense, signifies a law, ordinance, decree, &c. See the article **LAW**, &c.

Statute, in our laws and customs, more immediately signifies an act of parliament made by the three estates of the realm: and such statutes are either general, of which the courts at Westminster must take notice, without pleading them; or they are special and private, which last must be pleaded. It is held, that a public statute, made in affirmation of the common law, extends to all times after the making thereof, although it mentions only a remedy for the present; and where a thing is given or granted by statute, all necessary incidents are at the same time granted with it. The most natural exposition of a statute is, to construe one part by another of the same statute, because that best expresses the intent of the makers: also, statutes, in general, ought to be expounded in suppression of the mischief, and for the advancement of the remedy designed by any statute, yet so that no innocent person may suffer or receive any damage thereby. It is held, that statutes will continue in force though the records of them are destroyed, &c. But if a statute be against reason, or impossible to be performed, the same is void of course.

STATUTE is also used for a short instrument in writing, termed statute merchant, or statute-staple, which are in the nature of bonds, and called by the name statutes, on account of their being made pursuant to the forms prescribed by certain statutes, whereby it is directed, before what persons, and how they are to be made.

Statute-merchant is defined to be a bond acknowledged before one of the clerks of the statutes-merchant of the city of London, or two merchants assigned for that purpose, or before the mayor, or chief magistrate of other cities or corporations, or other sufficient persons, for that end appointed, sealed with the seal of the debtor and the king, upon condition that if the obligor pay not the debt at the day, execution may be awarded against his body, lands, and goods; in which case the recognissee, or obligee, shall hold the land to him, his heirs, and assigns, until

such time as the debt is levied; and a person who is in possession of land, on such statute, is called tenant, by statute-merchant.

Statutes-staple particularly concern merchants of the staple, are of the same nature with statutes-merchant, and are for debts acknowledged before the mayor of the staple in our chief cities, &c. in the presence of one or more of the constables of the staple, by virtue of which the creditor, on non payment of his money when due, has the same remedy against his debtor as is to be had upon a statute-merchant. See the article **STAPLE**.

At first statutes-merchant were contrived for the benefit of merchants only, to provide a speedy remedy for recovering the debts; but now they are used by others and are become one of the common securities of the kingdom. And a statute acknowledged on lands shall be satisfied before an obligation, the debt due whereof being but a chose in action, and recoverable by law; as is a debt upon a statute, or recognisance, in which case execution may be taken out immediately without further suit; though statute-staple, and likewise statutes-merchant are required to be entered within months, or they shall not be good against purchasers.

STATUTE-SESSIONS is taken for a meeting of constables and householders in for hundreds, by custom, for the debating differences between masters and servants, the rating of servants wages, and bestowing persons in service, &c.

STATUTO-MERCATORIO, a writ which lies for the imprisoning of a debtor, the forfeiture of his statute merchant bond, until such time as the debt be satisfied.

STATUTO-STAPULÆ, is a writ that lies for the taking of the body of a debtor on statute-staple-bond, and for seizing his lands and goods of him that has forfeited such bond.

STAVANGER, a port-town of Norway in the province of Bergen, capital of the territory Stavanger, situated on a peninsula in the German-ocean: east long. $6^{\circ} 30'$, north lat. $59^{\circ} 3'$.

STAVEREN, a port-town of the United Netherlands, in the province of West Friesland, situated on the Zuyder-sea: east long. $5^{\circ} 12'$, north lat. 53° .

STAVERS, or **STAGGERS**, among horse-riers, a giddiness in a horse's head, which ends in madness. This disease is frequently cured.

quently occasioned by turning out a horse to graze too soon, before well cold, where, by hanging down his head to feed, bad vapours and humours are generated, which oppressing the brain, are the proximate cause of this disease. Sometimes it comes by over-exercise in hot weather, which inflames the blood, &c. and sometimes by noisome smells in the stable, excessive eating, &c. The signs of it are dimness of sight, reeling and staggering, watery eyes, &c. At length, for perfect pain, he beats his head against the wall, thrusts it into the litter, rises and lies down with fury, &c. For the cure of this distemper there are various prescriptions, one of which is, first to bleed the horse, then to dissolve the quantity of a hazel-nut of sweet butter in a saucer full of wine; then taking some lint, or fine flax, dip it in the mixture and stop his ears with it, and stitch them for twelve hours: some boil an ounce and a half of bitter-almonds, two drams of ox-gall, half a pennyworth of black hellebore made into powder, grains of castoreum, vinegar and varnish, of each five drams; which they boil and strain, and then put into his ears.

TAY, in the sea-language, a big strong rope fastened to the top of one mast, and to the foot of that next before it, towards the prow, serving to keep it firm, and prevent its falling astwards or towards the poop. All masts, top-masts, and flag staves, have their stays, except the sprit-sail top-masts. That of the main-mast is called the main-stay. The main-mast, fore-mast, and those belonging to them, have also back-stays to prevent their pitching forwards or over-board, as going on either side of her.

To stay a ship, or to bring her on the stays, is to manage her tackle and sails so that she cannot make any way forwards; which is done in order to her tacking about.

TAY, in the manege. To stay or sustain the horse, is to hold the bridle firm and high. We likewise stay or sustain a horse with the in-leg or the in-heel, when he makes his croupe go before his shoulders upon volts. We stay a horse again when we hinder him to traverse, when we ride him equally, keeping him always subject, so that his croupe cannot slip out, and he can lose neither his cadence nor his ground, but marks all his times equal.

READY, a word of command, at sea, for the man at the helm to keep the ship

steady in her course, and not to make angles (or yaws, as they call them) in and out.

STEATITES, in the history of fossils, a name given by late authors to a substance called, in English, soap-earth, and which, though the authors on these subjects had not taken notice of that circumstance, was the very substance called *cimolia purpurascens*, or purple earth of *Cimolus*, by the antients. The later ages, finding the purple cimolian earth of the old writers to be wholly different from their white-kind, have given that name (though it is not easy to guess why) to the common fuller's earth, which has no tinge of purple in its whole substance. This earth however, called by us soap-earth, and steatites, is well worth enquiring after, as a substance for imitating the fine porcelain ware of China. Dr. Woodward much recommends it on this account, and repeated trials have been made of it since his time, and some of them very lately; in all which it has afforded the finest earthen-ware ever made with us, and promises fair, with good management, for the equaling any in the world. It is dug in many parts of Devonshire and Cornwall, and the neighbouring counties; the cliff of the Lizard-point is almost wholly composed of it, and the adjacent little islands abound with it; and from all these places it might be brought, at small expence, in any quantities. It is known from all other earths by these characters: it is composed of extremely fine particles, and is of a firm, equal, and regular texture, and a great weight. It is very firm and hard as it lies in the earth, but when it has been some time exposed to the air, it becomes almost of a stony hardness. It is of a perfectly fine, smooth, and glossy surface, softer to the touch than any other species of earth, and does not at all adhere to the tongue, or stain the fingers in handling: but drawn along a rough surface, as a piece of cloth, or the like, it marks it with a fine and even white line. In colour it is a clear white, veined and variegated very beautifully with purple of different degrees of deepness, and is of so fine a structure of parts, that when cut into thin pieces it is in some degree transparent. It makes no effervescence with acids, and burns to a pure white, even in its purple parts.

STEATOMA, a kind of encysted tumour, consisting of a matter like suet or lard,

lard, soft, without pain, and without discolouring the skin. See TUMOUR.

STEEL, a kind of iron refined and purified by the fire with other ingredients. See the article IRON.

Steel, of all other metals, is that susceptible of the greatest degree of hardness when well tempered, whence its great use in the making of tools and instruments of all kinds. Mr. Cramer observes, that the difference between iron and steel is, that the latter being much harder will not yield to the hammer, but is brittle instead of being ductile, and resists the file. Malleable iron grows rigid by being simply extinguished in cold water, but it yet retains a considerable degree of ductility in the cold, and may be extended in all dimensions with the hammer. Steel, however, if heated again, and cooled by slow degrees, may be filed and extended more or less by the hammer. But there are many degrees in the hardening of steel; for if it has been extremely red hot, and is then quenched in cold water in motion, it becomes greatly harder than if it had been but moderately red hot, and had been quenched in warm water. Steel is also of a darker colour than iron, and the surface of it, when broken, appears to consist of smaller granulated, or even striated, particles than the iron it was made of. Mr. Cramer further observes, that the method of making steel out of iron is either by cementation or by fusion. That by cementation may be performed in the following manner: choose some bars of pure iron, not too thick, and quite free from heterogeneous matter, the flexibility of it, both when hot and cold, being a very good sign thereof: prepare a cement of charcoal-dust, moderately pulverized, one part; and wood-ashes, half a part: or of charcoal dust two parts, bones, horns, or hair of animals, burnt to a blackness, in a close vessel and in a gentle fire, and afterwards reduced to powder, one part; wood-ashes, half a part: mix them together: prepare an earthen cylindrical vessel, two or three inches higher than the bars are long; put into the bottom of this vessel the cement, prepared as before directed, so that being gently pressed down it may cover the bottom of the vessel an inch and half deep; place then the bars perpendicularly, so that they may be every where about an inch from the sides of the ves-

sel and from each other; fill the interstices with the same cement, and cover also the bars with it, so that the vessel may be quite full; next cover it with a tile, and stop the joints with thin lute: put this vessel into a furnace, and keep it moderately but equally red hot, for six or ten hours together; when this is over, take the red hot bars out and dip them in cold water, they will then be brittle, and turned to steel. See CEMENTATION.

The method of making steel by fusion is as follows: take of iron-ore, or of unmalleable iron, of the first fusion, divide it into small parcels, and put them into a bed made of charcoal-dust, in a smith's forge: let the quantity of iron be but small for the experiment; put to it, as a defensive menstruum, some of the vitrescent scorize of sand, or stones of the same nature; then put upon them a quantity of charcoal; light this, and admit only a gentle blast of the bellows, that the scorize and the metal may both melt regularly: when this has been some time kept in fusion, take it out, and divide it into two parts, which make red hot, and hammer into long bars: finally, beat them red hot, and plunge them into cold water, and they will be found to be steel, so very hard as not to be fileable, and so brittle as to break asunder when struck with considerable force.

A bar of iron, when converted into steel, is not equally so converted in all its parts: the fire has always acted more strongly upon its surface than on its central parts, and it is therefore more perfect steel there than in its inner parts; but a perfection in the operation is not necessary to the steel's being good and useful, for the whole bar is often very good steel, as are also many bars made at the same time yet all, perhaps, differently affected.

If the composition which is to convert the iron into steel be too strong, or if the fire be too violent, or the matter continued too long in it, in all these cases the steel will be over made. The way to meliorate such steel as this, must be to divest it of part of its salts and its sulphur, but particularly the last; and Mr. Reaumur found, that, burying the bars of such steel in lime, or any other alkaline substance that would readily absorb the sulphurs, and placing it for a proper time in the fire, it would be in a manner decomposed again, and come out a very good and perfect steel.

By this management steel may again be converted

converted or reduced to its primitive iron, and a body of any middle degree between steel and iron may be produced by stopping the process at different points of time, or continuing it till all the adventitious salts and sulphurs are drawn off or absorbed. See **TEMPERING**.

Annealing or nealing of steel, is by some used for the softening it, in order to make it work easier, which is usually done by giving it a blood-red heat in the fire, and then taking it out and letting it cool of itself: some have pretended to secrets in annealing, by which they could bring down iron or steel to the temper of lead: this was done by often heating the metal in melting lead, and letting it cool again out of the lead. But this method is found by Moxon to have no other effect than what is had from the former. Steel may, indeed, be made a little softer than in the common way, by covering it with coarse powder of cow-horn or hoofs; thus inclosing it in a loam, heating the whole in a wood-fire till it be red hot, and then leaving the fire to go out of itself, and the steel to cool.

Steel manufactures, for every twenty shillings value, upon oath, pay, upon importation, 3 s. 10²/₁₀₀ d. and, on exportation, draw back, 3 s. 4⁵/₁₀₀ d. Steel manufactures, for every 112 lb. pay, on importation, 5 s. 87¹/₁₀₀ d. and, on ex-

portation, draw back the same money. But if exported to the british plantations there is no drawback.

STEEL GLASSES, a name given by some authors to the metalline spheres used in optics. These, according to Cardan, are made of three parts of brass, one part of tin, and one of silver, with an eighteenth part of antimony; but most either totally leave out the silver, or add only a twenty-fourth part, to save the expence. There are many other methods directed by several authors, but most use arsenic and tartar mixed with the metals. These are afterwards to be polished with emery, rotten-stone, putty, and the like.

STEELYARD, *statera romana*. See the article **BALANCE**.

STEENBERG, a town of dutch Brabant, situated on the confines of Zeland, twenty-five miles north of Antwerp.

STEENKIRK, a village of the austrian Netherlands, in the province of Hainault, ten miles north of Mons.

STEENWICK, a town of the United Ne-

therlands, in the province of Overijssel, situated near the confines of Friesland, eighteen miles north of Zwoll.

STEEPLE, an appendage erected generally on the western end of a church, to hold the bells. Steeples are denominated from their form, either spires or towers; the first are such as ascend continually diminishing either conically or pyramidally. The latter are mere parallelpipeds, and are covered a-top platform-like. See the articles **SPIRE** and **TOWER**. In each kind there is usually a sort of windows or apertures to let out the sound, and so contrived at the same time, as to drive it down.

STEERAGE, on board a ship, that part of the ship next below the quarter-deck, before the bulk-head of the great cabin, where the steersman stands in most ships of war. See the next article.

STEERING, in navigation, the directing a vessel from one place to another by means of the helm and rudder. He is held the best steersman who causes the least motion in putting the helm over to and again, and who best keeps the ship from making yaws, that is, from running in and out. There are three methods of steering, 1. By any mark on the land, so as to keep the ship even by it. 2. By the compass, which is by keeping the ship's head on such a rhumb or point of the compass, as best leads to port. 3. To steer as one is bidden or conned, which, in a great ship, is the duty of him that is taking his turn at the helm. See the article **COND**.

For the theory and effect of steering, see **NAVIGATION**, **SAILING**, &c.

STEEVE, on board a ship. The seamen say the bowsprit or the beak-head of a ship steeves, when it stands too upright, or not straight enough forward.

STEGANIUM, **SLATE**, in fossil-history. See the article **SLATE**.

STEGANOGRAPHY, the art of secret writing, or of writing in cyphers, known only to the persons corresponding.

STEGEBURG, a port-town of Sweden, in the province of East Gothland, situated on a bay of the Baltic: east longitude 16°, north latitude 58° 30'.

STEGNOTICS, in medicine; remedies proper to close and stop the orifices of the vessels or emunctuaries when relaxed, stretched, lacerated, &c. such as pomegranate-leaves and roses, plantain-leaves, tormentil-roots, &c. Siegnotics are pro-

per in the hæmorrhoids and other fluxes of the blood.

STELLA, a **STAR**. See the article **STAR**.

STELLATE, among botanists, expresses leaves which grow not less than six at a joint, and are arranged like the rays of a star.

STELLERA, in botany, a genus of the ostandria-monogynia class of plants, without any calyx; the corolla consists of a single, bell-shaped, permanent petal; there is no pericarpium, and the seed is single, shining, and beaked.

STELLIONATE, *stellionatus*, in the civil law, a kind of crime committed by a fraudulent bargain, where one of the parties sells a thing for what it is not; as if I sell an estate for my own which belongs to another, or convey a thing as free and clear which is already engaged to another, or put off copper for gold, &c.

STEM, in botany, that part of a plant arising out of the root, and which sustains the leaves, flowers, fruits, &c. See the article **STALK**.

STEM of a ship, that main piece of timber which comes bending from the keel below, where it is scarfed, as they call it; that is, pieced in; and rises compassing right before the fore-castle. This stem it is, which guides the rake of the ship, and all the butt-ends of the planks are fixed into it. This, in the section of a first-rate ship, is called the main stem. See the article **SHIP**.

False stem, in a ship, is that fixed before the right one, where that is made too flat for the ship to keep the wind well; this will make her rid more way, and bear a better sail.

STEMPLES, in mining, cross-bars of wood in the shafts which are sunk to mines. In many places the way is to sink a perpendicular hole or shaft, the sides of which they strengthen from top to bottom with wood-work, to prevent the earth from falling in; the transverse pieces of wood used for this purpose, they call stemples, and by means of these the miners, in some places, descend without using any rope, catching hold of these with their hands and feet.

STENAY, a town of the french Netherlands, in the province of Luxemburg, situated on the east side of the river Maes, twelve miles west of Montmedy.

STENCH. See the article **STINK**.

STENDEL, a town of Germany, in the circle of Upper Saxony, and marquiseate

of Brandenburg, situated thirty-six miles north of Magdeburg.

STENFORT, a town of Germany, in the circle of Westphalia, and county of Bentheim, situated eighteen miles north of Munster.

STENONIAN DUCT, or *ductus salivæ stemonius*, in anatomy, a name given from Steno, its discoverer, to one of the superior salival ducts running from each of the parotids, about three fingers long, and of the thickness of a wheat-straw, having a great number of roots. This duct passes over the masseter muscle through the middle of the cheek, and there perforates the buccinator muscle, and the membrane of the mouth near the second or third of the ductus molares, and at this perforation it discharges a very large quantity of its proper fluid into the mouth. See **SALIVAL**, **PAROTIDES**, &c.

STENTOROPHONIC TUBE, a speaking trumpet, thus called from Stentor, a person mentioned by Homer. See the article **TRUMPET**.

STEP. See the article **STAIRCASE**, &c.

STEP of the mast and capstan, in a ship, is that piece of timber whereon the masts or capstans do stand at bottom.

STEP and leap, in the manege, one of the seven airs or artificial motions of a horse, consisting, as it were, of three airs, *viz.* the pace or step, which is terra terra; the raising, which is the curvet, and the whole finished with a sault or leap. The step properly puts a horse on the hand, and gives him a rise to leap; like one that runs before he leaps, that he may go the higher or the farther. For leaps of all kinds, the rider is not to give any aids or helps with his legs, only to hold the horse well up with the bridle-hand when he rises before, that he may rise the higher behind. When he begins to rise behind, he is to put the bridle-hand a little forwards to hold him before, and stay him there on the hand as if he hung in the air, timing the motion of the bridle-hand so, as to make him like a ball on the bound, which is the great secret in leaping.

STEPHEN, or *St. STEPHEN'S DAY*, a festival of the christian church, observed on the 26th of December, in memory of the first martyr St. Stephen.

STERCULIA, in botany, a genus of the monoecia-monodelphia class of plants: the calyx of the male and female flowers is a very large, coriaceous, single leaved periz.

perianthium, divided into five segments : there is no corolla ; the fruit is orbicular, depressed, and generally divided into five cells : the seeds consist of a great number of oval kernels.

STEREOGRAPHIC PROJECTION, is the projection of the circles of the sphere on the plane of some one great circle, the eye being placed in the pole of that circle. The method and practice of this projection in all the principal places, *viz.* on the planes of the meridian, equinoctial, and horizon, have already been given under **MAP and PROJECTION**.

STEREOGRAPHY, the art of drawing the forms and figures of the solids upon a plane. See **SOLID and PLANE**.

STEREOMETRY, *στερεομετρία*, that part of geometry which teaches how to measure solid bodies, *i. e.* to find the solidity or solid content of bodies, as globes, cylinders, cubes, vessels, ships, &c. See the articles **GLOBE, CYLINDER, &c.**

STEREOTOMY, the art or art of cutting solids, or making sections thereof, as walls or other members in the profiles of architecture. See **SECTION**.

STERILITY, the quality of a thing that is barren, in opposition to fertility. See the article **FERTILITY**.

Nature has annexed sterility to all monstrous productions, that the creation might not degenerate. Hence the sterility of mules, &c.

Women frequently become sterile after a miscarriage or a difficult labour, by reason the uterus or some other of the genital parts are injured thereby.

STERLING, a term frequent in british commerce. A pound, shilling, or penny sterling, signifies as much as a pound, shilling, or penny of lawful money of Great Britain, as settled by authority.

STERN of a ship, usually denotes all the hindermost part of her, but properly it is only the outmost part abaft. See the article **SHIP, ABAFT, &c.**

STERN FAST, denotes some fastenings of ropes, &c. behind the stern of a ship, to which a cable or hawser may be brought or fixed, in order to hold her stern to a wharf, &c.

STERN-POST, a great timber let into the keel at the stern of a ship, somewhat stopping, into which are fastened the after-planks ; and on this post, by its pintle and gudgeons, hangs the rudder.

STERN, among hunters, is the tail of a wolf of greyhound. See **TAIL**.

STERN-CHASE. See the article **CHASE**.

STERNBERG, a town of Germany, in the circle of Upper Saxony and marquissate of Brandenburg, situated twenty-three miles north-east of Frankfort upon the Oder.

STERNOHYOIDÆUS, in anatomy, a long, thin, flat muscle, fixed by its lower extremity in the superior and lateral part of the inner or posterior side of the sternum, in the posterior part of the sternal extremity of the clavicle, in the transverse ligament which connects these two bones, and in the inner or backside of the cartilage of the first rib : from hence it runs up to the fore-side of the *aspera arteria*, joins its fellow by a membrane which forms a sort of *linea alba*, and is inserted laterally in the lower edge of the basis of the *os hyoides*.

STERNUM, in anatomy, the breast-bone, being a cartilaginous sort of bone which composes the forepart of the breast, and into which the ribs are fitted. See the article **RIBS**.

In adults this bone is often single, but sometimes it has two, sometimes three, pieces concurring to form it. Its substance is fungous and spongy ; its upper part is called the *manubrium* or handle, and in this there is on each side a cavity for the articulation of the clavicles. In the middle it is narrow, and broad at the lower part. To this also there adheres a cartilage called from its figure *cartilago ensiformis*, or *xiphoides*. This is usually single ; sometimes it is bifurcated, and not unfrequently bony throughout ; and on each side of the sternum there are seven cavities for the articulation of the seven true ribs.

The uses of the sternum are, 1. To form the anterior part of the breast. 2. To support the ribs and the clavicles. 3. To defend the parts contained in the cavity of the breast. 4. To serve for the insertion of the *mediastinum*, and for the sustaining the heart itself and several muscles.

The sternum is equally subject to depressions and fractures from falls or blows with the rest of the bones. When either of these happen, the part is not only uneven and painful, but the subjacent arteries and veins are also contused or ruptured ; whence arise pains in the breast, difficulty of breathing, violent coughs, spitting of blood, or else extravasations of it in the *præcordia*, or between the duplicatures of the *mediastinum*, with many bad symptoms of the like nature.

nature. A fractured sternum will therefore be very evident from these signs, and from its being moveable to the touch, especially when one part grates against another. In order to set the fracture of this bone, if any part of it be displaced, Heister directs the patient to be laid on his back on a bed or table, putting a hard pillow, a large parcel of cloth rolled up, or some other such body under his back, and pressing down his shoulders, by which means the sternum will be elevated and extended; and to facilitate the reduction, the surgeon must press the sides of the breast together, and stroke them pretty strongly; but when this method is impracticable, or not proper, the skin must be divided, and the depressed part of the sternum lifted up into its place by means of an elevatory, or else by a screw gently wormed into the part, and then pulled upwards. If, as it sometimes happens after the reduction, violent pains continue under the sternum, and if blood should gather and suppurate internally between the duplicature of the mediastinum, it will not be improper to trepan the lower part of the sternum, after the manner done to the cranium; and when the putrid matter is discharged, and the cavity cleansed, it should be carefully treated with some vulnerary balsam. Lastly, if any blood should be found extravasated in the cavity of the thorax, the cure seems to depend entirely upon discharging this by the paracentesis. See the articles ELEVATORY, TREPANNING, EXTRAVASATION, and PARACENTESIS. As to the business of dressing, after the application of compresses dipped in warm spirit of wine, we must go on with that kind of bandage called the napkin and scapulary.

STERNUTATION. See SNEEZING.

STERNUTATIVE, or STERNUTATORY, a medicine proper to produce sneezing. Sternutatives are of two kinds, gentle and violent. Of the first kind are betony, sage, majoram, tobacco, and the whole fashionable tribe of snuffs. Of the latter kind are euphorbium, white hellebore, pellitory, &c. Sternutatives operate by their sharp pungent parts, vellicating the inner membrane of the nose, which is exceeding sensible, and occasioning the serous matter contained in the glands of the nose and in several sinuses situated in the base of the cranium and the os frontis, to be expelled.

STETIN, a city and port-town of Ger-

many, in the circle of Upper Saxony, capital of the dutchy of Pomerania, situated on the west shore of the river Oder: east long. $14^{\circ} 50'$, north lat. $53^{\circ} 30'$.

STEVENAGE, a market-town of Hertfordshire, situated thirty miles north of London, and ten northwest of Hertford.

STEVENSWAERT, a fortress of the Netherlands, in the province of Gelder, situated on the river Maes, twenty miles north-east of Maeltricht.

STEW, a small kind of fish-pond, the peculiar office of which is to maintain fish, and keep them in readiness for the daily use of a family, &c. The fish bred in the large ponds, are drawn out and put in here. For two large ponds of three or four acres a-piece, it is adviseable to have four stews, each two rods wide, and three long. The stews are usually in gardens, or at least near the house, to be more handy, and the better looked to. The method of making them is to carry the bottom in a continued decline from one end, with a mouth to favour the drawing with a net. See FISH-POND.

STEWES, or STUES, were also places antiently permitted in England to women of professed incontinency, for the proffer of their bodies to all comers. These were under particular rules and laws of discipline, appointed by the lord of the manor.

STEWARD, an officer appointed in another's stead or place, and always taken for a principal officer within his jurisdiction. Of these there are various kinds: The greatest officer under the crown is the lord high steward of England, an office that was antiently the inheritance of the earls of Leicester, till forfeited by Simon de Mountfort, to king Henry III. But the power of this officer is so very great, that it has not been judged safe to trust it any longer in the hands of a subject, excepting only *pro hac vice*, occasionally: as to officiate at a coronation, at the arraignment of a nobleman for high-treason, or the like. During his office, the steward bears a white staff in his hand, and the trial, &c. ended, he breaks the staff, and with it his commission expires. There is likewise a lord steward of the king's household, who is the chief officer of the king's court, has the care of the king's house, and authority over all the officers and servants of the household, except such as belong to the chapel, chamber, and stable. See the article HOUSEHOLD.

There

There is also a steward of the marshalsea, who has judicial authority. And in most corporations, and all houses of quality in the kingdom, there is an officer of the name and authority of a steward. The steward of a ship is he who receives all the victuals from the purser, and is to see it well stowed in the hold; all things of that nature belonging to the ship's use are in his custody; he looks after the bread, and distributes out the several messes of victuals in the ship; he hath an apartment for himself in the hold, which is called the steward's room.

STEWARTEA, in botany, a genus of the monadelphia - polyandria class of plants, with a single leaved patent perianthium, divided into five segments: the corolla consists of five large, oval, patent, and equal petals; the fruit is an oval capsule, with five angles, five cells, and five valves, containing several kernels.

STEYNING, a borough-town of Suffolk, situated forty miles south of London, and thirteen miles west of Lewes.

It sends two members to parliament.

STEYRE, or **STYREG**, a town of Germany, in the circle and dutchy of Austria, situated on the north-side of the Danube, eight miles north-west of Ens.

STIBIUM, *antimonium*. See **ANTIMONY**.

STICKLEBACK, in ichthyology, a common name for the three several species of the *Gasterosteus*. See **GASTEROSTEUS**. The common stickleback is that with three prickles on the back; the lesser stickleback is that with ten prickles on the back; and the great sea-stickleback has fifteen prickles on the back, grows to six or seven inches in length, and is moderately thick in proportion.

STIGMATA, in natural history, the apertures in different parts of the bodies of insects, communicating with the tracheæ, or air vessels, and serving for the office of respiration. Nature has given to these minute animals a much larger number of tracheæ and bronchia than to us; all the two winged and four winged flies, which have a single or undivided corcelet, to which their legs are all fixed, have also four stigmata in that corcelet, two on each side; they have them also on the rings of their body, but those on the corcelet are the most considerable. Of the four on the corcelet, the two anterior ones are usually the largest; these, as well as the posterior ones are oblong, and placed obliquely to the length of the

body. The colour of the stigmata frequently differs from that of the corcelet; some are yellowish, others of a coffee-colour, or some degrees of a fallow colour, in flies whose corcelet is brown, black, or blue. Flies have, beside these, several stigmata also in the rings of their bodies, perhaps in every one of them: these stigmata are not like those of the corcelet, but are round, usually a little eminent above the rest of the surface, and resembling a pin's head.

STIGMATA, in antiquity, certain marks impressed on the left shoulders of the soldiers when listed.

STIGMATA were also kinds of notes or abbreviations, consisting only of points disposed various ways, as in triangles, squares, crosses, &c.

STIGMATIZING, among the antients, was inflicted upon slaves, as a punishment, but more frequently as a mark to know them by, in which case it was done by applying a red-hot iron marked with certain letters to their foreheads, till a fair impression was made, and then pouring ink into their furrows, that the inscription might be the more conspicuous. Stigmatizing, among some nations, was, however, looked upon as a distinguishing mark of honour and nobility.

STIL de grain, in the colour-trade, the name of a composition used for painting in oil or water, and is made by a decoction of the lycium or avignon-berry in alum-water, which is mixed with whiting into a paste, and formed into twisted sticks. It ought to be chosen of a fine gold-yellow, very fine, tender and friable, and free from dirt.

STILE, *stilus*. See the article **STYLE**.

STILES, in carpentry, denote the upright pieces which go from the bottom to the top of any wainscot, or the like.

STILLATITIOUS OILS, such as are produced by distillation, in opposition to those got by infusion, expression, &c.

STILL-BOTTOMS, in the distillery, a name given by the traders to what remains in the still after the working the wash into low wines. These bottoms are procured in the greatest quantity from the malt-wash, and are of so much value to the distiller, in the fattening of hogs, &c. that he often finds them one of the most valuable articles of the business. They might also, as Dr. Shaw observes, be put to other uses, such as the affording a large proportion of acid spirit, an oil, a fuel, and a fixed salt, and

and with some address, and good management, a vinegar and tartar; another very advantageous use of them, is the adding them to the next brewing of the malt for more spirit: the increase of the produce from this is more than is easily conceived. It also more readily disposes the new wash to ferment, and gives the spirit a vinosity, that it cannot have without it; the proportion in this case must never exceed that of a fifth or a sixth part of the whole quantity of liquor employed. See DISTILLERY.

STILL-HOUSE. The Dutch have much the advantage of us in the structure of their still-houses. The general rules in building those houses, according to Shaw, should be such as follow. The first caution is, to lay the floor aslope, not flat, where any wet work is to be performed. It should also be well flagged, with broad stones, so that no wet be detained in the crevices, but all may run off, and be let out at the drains made at the bottom and sides. The stills should be placed abreast on that side of the still-house to which the floor has its current. Fronting the stills, and adjoining to the back of the wall, should be a stage for holding the fermenting backs, and these being placed at a proper height, may empty themselves by means of a cock and a canal into the stills which are thus charged with very little trouble. Near this set of fermenting backs should be placed a pump or two, that may readily supply them with water, by means of a trunk, or canal, leading to each back; under the pavement adjoining to the stills should be a kind of cellar, wherein to lodge the receivers, each of which should be furnished with its pump, to raise the low wines into the still for rectification; and through this cellar the refuse wash, or still bottoms, should be discharged by means of a hose, or other contrivance.

STIMULATING, *stimulus*, a property in angular or sharp bodies, whereby they vellicate and cause vibrations and inflections of the fibres of the nerves, and a greater derivation of nervous fluid into the parts affected. Stimulants produce pain, heat, redness, &c. They may be reduced to violent penetrating depilatories, gentle sinapisms, vesicatories, and caustics. See the articles SINAPISM, VESICATORY, &c.

STING, *aculeus*, an apparatus in the body of certain insects, in form of a little

spear, serving them as a weapon of offence. The sting of a bee or wasp, is a curious piece of mechanism, it consists of a hollow tube, at the root whereof there is a bag full of sharp, penetrating juice, which in stinging is injected into the flesh, through the tube; within the tube, Mr. Derham has observed, there lie two sharp small bearded spears: in the sting of a wasp, he told eight beards on the side of each spear, somewhat like the beards of fish-hooks. One of these spears in the sting, or sheath, lies with its point a little before the other, to be ready, as should seem, to be first darted into the flesh, which once fixed by means of its foremost beard, the other then strikes too, and so they alternately pierce deeper and deeper, their beards taking more and more hold in the flesh; after which the sheath or sting follows, to convey the poison into the wound, which that it may pierce the better, is drawn into a point with a small slit below that point for the two spears to come out at. By means of these beards, it is, that the animal is forced to leave its sting behind it, when disturbed, because it can have no time to withdraw the spears into the scabbard.

Heister assures us, that the best cure for the sting of bees or wasps is to anoint the part with vinegar mixed with theriaca; or theriaca mixed with spirit of wine; or a menian bole with vinegar.

STINK, or **STENCH**, a disagreeable smell exhaling from a corrupted, or other body, and which is prejudicial to the nose and brain. A stinking breath is usually the result either of diseased lungs, or else of scorbutic gums, &c. A stinking nose is the result of a deep ulcer within the nose, whence arise fetid scales, &c. See the article FOETOR.

STINT, in zoology, the name of a small bird common about the sea-shores in many counties of England, and seeming to be the same with the cinclus prior of Aldrovand, and the schœnichis, or junco of Bellonius, called by the french *alouette de mer*, the sea-lark. See ALAUDA. It is somewhat smaller than the common lark, and in shape resembles the smallest snipe. Its beak is black, slender, and strait; its feet of a greenish, or brownish, black; its back is grey, variegated with oblong, black spots, and its wings somewhat of a reddish brown; its neck is grey, and its head variegated with black and a reddish brown; its wings are long,

and when folded reach beyond the end of the tail; and its rump is somewhat reddish, with black streaks.

STIPA, in botany, a genus of the triandriadigynia class of plants, the calyx of which is a bivalve glume, consisting of a single flower: the corolla is also bivalve; the fruit adheres to the calyx; and the seed is single, oblong, and covered.

STIPEND, *stipendium*, among the Romans; signified the same with tribute; and hence *stipendiarii* were the same with tributarii.

STIPULATION, in the civil law, the act of stipulating, that is, of treating and concluding terms and conditions to be inserted in a contract. Stipulations were antiently performed at Rome, with abundance of ceremonies; the first whereof was, that one party should interrogate, and the other answer, to give him his consent, and oblige himself. By the the antient roman law, no body could stipulate but for himself; but as the tabelliones were public servants, they were allowed to stipulate for their masters, and the notaries, succeeding the tabelliones, have inherited the same privilege.

STIRIA DUTCHY, in Germany, is part of the circle of Austria, bounded by the dutchy of Austria on the north; by Hungary on the east; and by Carinthia and Carniola on the south-west.

STIRLING, or **STRIVILING**, a town of Scotland, capital of the county of Stirling, situated on the river Forth, thirty miles north-west of Edinburgh, defended by a castle and other works.

STIRRUP, or **STIRROP**, in the manege, a rest, or support for the horseman's foot, serving to keep him firm in his seat, and to enable him to mount. The great art of a cavalier in the antient tournaments, was to make his antagonist loose his stirrup, that is, slip the foot out of it. For combating, it is a rule to have the right foot-stirrup somewhat shorter than the other. The stirrup-foot is the near, or the left foot before. Stirrup-leather is a thong of leather descending from the saddle by the horse's ribs, upon which the stirrups hang, and the stirrup-bearer is an end of leather made fast to the end of the saddle, to truss up the stirrup when the rider is alighted, and the horse sent to the stable.

STIRRUP of a ship, a piece of timber put upon a ship's keel, when some of her keel happens to be beaten off, and they

cannot come conveniently to put or fit in a new piece; then they patch in a piece of timber, and bind it on with an iron, which goes under the ship's keel, and comes up on each-side of the ship, where it is nailed strongly with spikes, and this they call a stirrup.

STIRUM, a town of Germany, in the dutchy of Berg, twelve miles north of Dusseldorp.

STIVES, the antient Thebes, in the province of Achaia, now Livadia, in european Turkey. See **LIVADIA**.

STOAKED, on board a ship. When the water in the bottom cannot come to the well of the pump, they say, the ship is a-stoak, or stoaked: so they say also, the limber holes are stoaked, when the water cannot pass through them; and the pump is stoaked, when something is got into it, which chokes it up, so that it will not work.

STOCKHERN, a town of Germany, in the circle of Westphalia, and bishopric of Liege, situated on the river Maes, twelve miles north of Maastricht.

STOCK, in gardening, &c. the stem or trunk of a tree.

STOCKBRIDGE, a borough town of Hampshire, situated seven miles north-west of Winchester.

It sends two members to parliament.

STOCK BROKER, see the article **BROKER**, and the next article.

STOCK-JOBING, the art or mystery of trafficking in the public stocks or funds. If stock-jobbers make any contract for the sale of stock, when they are not actually possessed of, or intitled to the same, those contracts will be deemed void. Likewise the parties so agreeing to sell, are liable to a penalty of 500*l*. The time of tendering stock sold, is held to be the last hour of the day on which it was to be transferred, and then an actual transfer is not necessary, unless the person to whom it ought to be made be at the place and time ready to receive the same. See the article **BROKER**.

STOCK-FISH, or **STOCK-FISCH**, in commerce, a kind of dried salted-fish, of a greyish ash-colour, and the belly somewhat whiter, being only cod-fish cured in a particular manner, which makes it necessary to beat it with sticks before it is fit for dressing. See **FISHERY**.

STOCKHOLM, the capital city of Sweden, situated on several small islands in the Meller Lake; east long. 18°, north lat. 59° 30', three hundred miles north-east

east of Copenhagen; nine hundred north-east of London; and four hundred west of Petersburg. It is neither walled nor fortified, being sufficiently secured by nature, with little rocks and islands, which surround it, though it has a spacious harbour sufficient for the largest fleets. That part of the town which is properly the city, stands upon a little island that is not more than a mile and a half in circumference, but the suburbs on the adjacent islands, are much larger. The inhabitants are computed about thirty thousand.

STOCKING, that part of the cloathing of the leg and foot which immediately covers their nudity, and screens them from the cold, &c. Antiently, the only stockings in use were made of cloth, or of milled stuffs sewed together; but since the invention of knitting and weaving stockings of silk, wool, cotton, thread, &c. the use of cloth stockings is quite out of doors. The modern stockings, whether woven or knit, are a kind of plexuses, formed of an infinite number of little knots called stitches, loops, or meshes, intermingled in one another. Knit stockings are wrought with needles made of polished iron or brass wire, which interweave the threads, and form the meshes the stocking consists of. This operation is called knitting, the invention whereof is commonly attributed to the Scots, on this ground, that the first works of this kind came from thence. It is added, that it was on this account that the company of stocking-knitters established at Paris, in 1527, took for their patron St. Fiacre, who is said to be the son of a king of Scotland. Woven stockings are ordinarily very fine; they are manufactured on a frame, or machine of polished iron, the structure and apparatus whereof being exceedingly ingenious, are represented in plate CCLXI. where A is the jack for the bobbins to turn upon; B is the sizer, or woman whose business it is to twist the threads as they shall best suit the frame, in which the work is to be performed; C, the rices which wind the hanks or skains upon the bobbins for the use of the sizer; D, the winder; and E the stocking frame, or engine, with the maker at work. 1. Are the treddles, like those of other sorts of looms; 2. is the bobbin of twisted silk, &c. fixed on the bobbin-wire, which it turns with ease to feed the engine; 3. is the wheel, by whose

motion the jacks are drawn together upon the needles; 4. is the silk, &c. which runs off the bobbin, and is in that posture directed up to the needle to be looped; 5. is the needle on which the stockings are made according to art.

The English and French have greatly contested the honour of the invention of the stocking loom; but we are assured whatever pretensions the French claim to this invention, that the same was certainly devised by William Lee, of St. John's College, Cambridge, in the year 1589, though it is true, that he first made it public in France, after despairing of success in his own country.

Cotton and thread-stockings, the dozen on importation, pay 8s. 4 $\frac{53\frac{1}{2}}{100}$ d. and

draw back on exportation, 7s. 6 $\frac{56\frac{1}{2}}{100}$ d.

Frames and engines for the making and knitting of stockings, gloves, &c. shall not be exported upon penalty of 40l.

STOCKPORT, a market-town of Cheshire, situated thirty-four miles north-east of Chester.

STOCKTON, a port-town of Durham, situated near the mouth of the river Tees sixteen miles south of Durham.

STOCKZOW, a town of Bohemia, in the duchy of Silesia, situated on the river Vistula, thirty-seven miles south-east of Troppaw.

STOCKS, among ship-carpenters, a frame of timber, and great posts made ashore to build pinnaces, ketches, boats, and such small craft, and sometimes frigates. Hence we say, a ship is on the stocks, when she is a building.

STOCKS, *cippus*, a wooden machine to press the legs of offenders in, for the security of disorderly persons, and by the way punishment in divers cases, ordained by statute, &c. And it is said, that every vill within the precinct of a town is indictable for not having a pair of stocks, and shall forfeit 5l.

STOEBE, in botany, a genus of the synnema-polygamia æqualis class of plants, the hermaphrodite corolla of all the flowers is equal; the proper one is most petalous and funnel-shaped; the limb is quinquefid and patulous; there is pericarpium; the seed, which is contained in the cup, is solitary, oblong, and crowned with a long hairy pap.

STOICS, a sect of ancient philosophy, the followers of Zeno, thus called from

The STOCKING-FRAME, and other Apparatus used in the Manufactory
of STOCKINGS





the greek *σάλα*, which signifies a porch or portico, in regard Zeno used to teach under a portico, or piazza. It was the common fault of the stoics to introduce abundance of subtilty and dryness into their disputations, either by word of mouth, or in writing. They seemed as carefully to avoid all beauty of stile, as depravity of morals. Chrysippus, who was one of the stoics, did no great honour to his sect, and could only disgrace it. He believed the gods perishable, and maintained, that they would actually perish in the general conflagration. He allowed the most notorious and most abominable incests, and admitted the community of wives amongst sages.

To the praise of the stoics in general, it must, however, be confessed, that, less intent than other philosophers upon frivolous and often dangerous speculations, they devoted their studies to the clearing up of those great principles of morality which were the firmest supports of society; but the dryness and stiffness that prevailed in their writings, as well as in their manners, disgusted most of their readers, and abundantly lessened their utility. Zeno's chief followers, among the Greeks, were Lucippus, Cleanthus, Chrysippus, Diogenes Babylonius, Antipater, Panætius, Possidonius, and Epictetus. Among the Romans, Cato, Varro, Cicero, Seneca, the emperor Antoninus, &c. The stoics cultivated logic, physics, metaphysics, &c. but especially ethics. The principal of their dogmata, of the former kinds, are, that there are certain catalepsis or comprehensions, called *αἰσθητικὰς ἐννοιὰς*, innate ideas or principles, naturally found in the mind; that God is the seminal cause of the universe, and with the Platonists, that the world is an animal, by reason of God's inhabiting and informing every part thereof; that nature is an artificial fire tending to generation; and that the world is at last to be destroyed by a conflagration. As for the morality of the stoics, it was couched much in paradoxes; as that a wise man is void of all passions, or perturbation of mind; that pain is no real evil, but that a wise man is happy in the midst of torture, is always the same, and is always joyful; that there is none else free; that none else ought to be esteemed king, magistrate, poet, or philosopher; that all wise men are great men; that they are the only friends or lovers; that nothing can happen to them

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beyond their expectations; that all virtues are insensibly connected together; that all good things are equal, and equally to be desired; that goodness admits of no increase or diminution. They own but one God, whom they however, call by various names, as Fate, Jupiter, &c. by which they did not mean various things, but various powers and relations of the same thing. Providence they expressed under the name Fate, which Chrysippus defines to be a natural series, or composition of things mutually following each other, by an immutable nexus, or tie, fixed from all eternity. They held the immortality of the soul.

STOKEGOMER, a market-town of Somersetshire, situated twenty-two miles west of Wells.

STOKESLY, a market-town of Yorkshire, situated 30 miles north of York.

STOLBERG, a town of Germany, in the circle of Upper Saxony, and territory of Thuringia, fifty-eight miles north-west of Leipzig.

STOLE, *stola*, a sacerdotal ornament wore by the romish parish-priests over their surplice, as a mark of superiority in their respective churches; and by other priests, over the alb, at celebrating of mass, in which case it goes across the stomach; and by deacons, over the left shoulder, scarf-wise; when the priest reads the gospel for any one, he lays the bottom of his stole on his head. The stole is a broad swath, or slip of stuff hanging from the neck to the feet, with three crosses thereon. The bishops anciently pretended, that the parish-priests were never to appear before them, but in their stole. In Flanders and Italy, they always preach in stoles; it is supposed to be a representation of the extremities of the long robe, wore by the high-priest of the Jews..

Groom of the STOLE, the eldest gentleman of his majesty's bed chamber, whose office and honour it is to present and put on his majesty's first garment, or shirt, every morning, and to order the things in the chamber. See **BED-CHAMBER**.

Order of the STOLE, an order of knights instituted by the kings of Arragon. Another military order, at Venice, is called the order of the golden stole; thus called from a golden stole, which those knights wore over their shoulder, reaching to the knee, both before and behind, a palm and a half broad. None are

raised to this order but patricians, or noble Venetians. It is uncertain when either of these orders was instituted.

STOLPE, a town of Germany, in the circle of Upper Saxony, and dutchy of Pomerania, situated on a river of the same name: east long. 17°, north lat. 54° 36'.

STOMACH, *σπασαχ*, in anatomy, is a hollow membranous part, placed mostly in the left hypocondrium, immediately under the diaphragm, and in an oblique situation, between the liver and the spleen. Its figure, as may be seen in our figure and description of the intestines, is like that of the bag of a pair of bag pipes. Its division is into two parts, *viz.* into two orifices and a bottom. Its left orifice, called *cardia*, is placed much higher than its right, and is continuous with the *gula*, and furnished with a great number of nerves. Its right orifice is called the *pylorus*, and is connected with, or opens into, the intestines. In this part there is a singular valve, the office of which is, to close the stomach. The *pylorus* is connected to the upper part of the stomach by a ligament. See **HYPOCHONDRIA**, **DIAPHRAGM**, &c.

The size of the stomach in human subjects is various; in people addicted to gluttony, it is usually very large; and in men it is in general larger than in women. In the human body it is always single, but many of the beasts have several stomachs. Its vessels are arteries, veins, nerves, and lymphatics. Its arteries, called *gastricæ*, it receives from the *coeliac*: the *gastric veins* all run to the *vena portæ*; among these are observable, the *vasa brevia*, which go off to the splenic branch, and the *vena coronaria*, which surrounds the stomach. Its nerves principally enter at the left orifice; they come from the *par vagum*, and are very large, and hence it is, that the stomach is so sensible: the lymphatics go to the *receptaculum chyli*. The substance of the stomach is membranaceous, and is composed of four coats. The first coat is membranaceous, in the strict sense of the term; the fibres of this run transversely. The second is muscular; in this the course of the fibres is various, and as it were inextricable. Some of them run circularly, as it were, from the upper part to the lower; and others only on the upper part of the stomach, between the two orifices; others run obliquely from the left side to the right, and some surround

the orifice. The third coat of the stomach is nervous; this forms a multitude of wrinkles, and is furnished with a number of sanguiferous vessels, and small glands, which secrete the liquor *gastricus*, or liquor of the stomach; this is more readily observed in hogs, than in the human body. The fourth is a thin, villose, and porous coat, and adheres very firmly to the former.

The use of the stomach is for the digestion of our food, that is, to receive, contain, dissolve, and change what is swallowed by the mouth; and after a sufficient concoction, to expel it through the *pylorus* into the intestines; possibly it also absorbs, and retains the most subtle parts of what it has thus prepared for nutrition. It also is the organ on which the sensation of hunger resides.

For the action of the stomach in turning the aliments into chyle, see the article **CHYLIFICATION**.

For an inflammation of the stomach, see the article **INFLAMMATION**.

Heat of the STOMACH. See **SODA**.

Heart-burn, or pain in the STOMACH.

See the article **CARDIALGIA**.

STOMACH-BRUSH, *Excuscia Ventriculi*. See the article **EXCUTIA VENTRICULI**.

STOMACHIA FEBRIS, the **STOMACHIC FEVER**, a name given by Hæstler, and others, to a species of fever, called by others, a mesenteric fever. See the article **MESENTERIC FEVER**.

STOMACHIC, in pharmacy, medicines that strengthen the stomach, and promote digestion, &c. See **DIGESTION**.

Stomachic corroboratives are such as strengthen the tone of the stomach and intestines, among which are carminatives, as the roots of galangals, red gentian, zedoary, pimpinella, calamus aromaticus, and arum. Of barks and rinds, those of *canella alba*, *sassafras*, citrons, seville and china oranges, &c. Of spices, pepper, ginger, cloves, cinnamon, cardamums, and mace. Other things of this nature are, among simples, roman and common chamæmille, wormwood, mint, *carduus benedictus*, and the four carminative seeds. Of preparations, the oil of cedar, oil of oranges by expression, oils of common chamæmille, *daucus creticus*, *animum tellatum*, cumin, caraway, mint, and wormwood, with the spirit of salt and sweet nitre. Among compounds, are the *fil volatile sylvii*, the stomachic elixir, the essence of orange-peel, with sweet spirit of nitre, tincture

tincture of tartar, oils of oranges prepared by expression, the compound essence of wormwood, &c.

STOMACHIC, is also applied to the arteries, veins, &c. of the stomach. See the article **STOMACH**.

STOMACHUS, in anatomy, the same with the oesophagus, or gula. See the article **OESOPHAGUS**.

STOMATIA, in natural history, a genus of simple shells, without any hinge, and formed of one piece; its figure is depressed and flat, its mouth the most patent of all the shells, the limpet only excepted; it has a short spiral turn running into the mouth, at the head; and has no perforations in any part of the surface. The animal inhabiting this shell is a nereis.

STOMATICA, a term used by some for all medicines used in disorders of the mouth and fauces.

STONES, in natural history, are defined to be essentially compound fossils, not inflammable, nor soluble in water or oil, nor at all ductile; found in continued strata, or beds, of great extent; formed either of a congeries of small particles, in some degree resembling sand, and lodged in a smoother cementitious matter, or else of this cementitious matter, and the gritt or sand-like particles, running together into one smooth mass; or, finally, of granules cohering by contact, without any cementitious matter among them; or composed of crystal or spar, usually debased by earth, and often mixed with talc, and other extraneous particles. See the articles **SAND**, **CRYSTAL**, **SPAR**, **TALC**, &c.

Of this class of fossils there are three orders; and under these, eight genera.

The first order comprehends all the coarse harsh, and rough stones, of a lax texture, and composed of a visible gritt, resembling sand in form, and usually immersed in a cementitious matter, and of little natural brightness; scarce capable of any polish, and naturally mouldering away in form of powder from the tools of the workmen. The genera of this order are two, *viz.* the ammonchista and psaduria; the former of which constitute our grey and rough slates, and the latter comprehends most of the stones used in building, particularly portland stone. See the articles **SLATE** and **PORTLAND STONE**.

The second order consists of stones, moderately fine, of a more compact and

even texture, scarce distinguishable construction, and affording no sand-like particles to the view; of some natural brightness, capable of a tolerable polish, and flying off from the tools of the workmen in form of small chips. Under this order are comprehended the symplexia and stegania. See the articles **SYMPEXIMUM** and **STEGANIUM**.

The third order consists of stones, of a very fine substance and elegant structure, naturally of a great brightness, and capable of an elegant polish; composed of granules of various shapes and sizes, but usually flattish, sometimes more, sometimes less distinct; and, in some species, running together into uniform masses, but never lodged in any cementitious substance. Of this order are the marbles, alabasters, porphyries, and granites. See the articles **MARBLE**, **ALABASTER**, **PORPHYRY**, and **GRANITE**.

For the formation of **STONES**, see the article **LITHOGENESIA**.

Pudding STONE, *lithozugia*. See the article **LITHOZUGIA**.

Figured or formed STONES, among naturalists, stones found in the shape of shells, or other parts of animals.

There are two very different opinions concerning the origin of these stones, which have occasioned great disputes among the learned. One is, that these bodies, though resembling ever so exactly the sea-fishes, yet never were in the sea at all; but that the first semina of the sea-shells, corals, and other substances, being carried by the sea-water through the subterranean passages into all parts of the earth, even into the highest mountains, have been there left in vast numbers, and growing there among stony matter, have arrived at their true bulk and figure, but in a stony substance. But the other opinion seems to be a true one, which declares them to be all of marine origin at first, and that they were brought to the places where we find them in this fossil state, at the time of the universal deluge, and have been since altered into the nature of stones, by long lying in the earth in the way of waters impregnated with stony particles, which they have deposited in them, after entering their substance in their passage through the earth. See the article **SHELL**.

As to the petrified teeth of animals, called by authors *lycodontes*, *glossopetræ*, &c. See the articles **LYCODYNTES**, **GLOSSOPETRA**, &c.

STONE, *lithiasis* and *calculus humanus*, in medicine, a stony or terrestrial concretion in any of the urinary passages, which occasions a difficulty in making water, and a pain in the small of the back, or about the os pubis. When this collection is so large as to form one or more bodies, unable by reason of their size to pass through the conduits of urine, they frequently cause great pain, ulcers in the parts, and an intire suppression of urine; and, from the part where this obstructing matter happens to lodge, this distemper receives its denomination, as from the kidneys, bladder, ureters, or urethra.

This disorder, says Dr. Shaw, may sometimes have an hereditary cause; that is, the urinary passages may be naturally straighter than they ought to be; or the constitution may be naturally disposed to generate a stony matter; an obstructed perspiration, and a cold or moist air, may also give rise to it; for by means hereof the more heavy particles of the animal fluids will be detained in the body.

Another occasion of this distemper may be the use of such waters, as by running through various strata of the earth, are impregnated with stony particles. There are some wines too, and other liquors, which being either foul or not sufficiently fined down, or abounding in tartar, or other terrestrial corpuscles, may lay the foundation for the stone. Again, in persons subject to the asthma or gout, who have a weak digestion, viscid chyle, and stony concretions in the joints, there are manifest seeds of this distemper. In short, whatever can bring on an accumulation of earthy particles in the urinary passages, whether by obstructing or lessening the capacity of the canals, or by immediately or remotely producing the substance itself, will cause gravel, and in time the stone.

The symptoms of the gravel or stone are, frequently, a nausea and vomiting, with a numbness down the leg and thigh of the part affected; a pain fixed or moveable, great or less, in proportion to the bulk of impacted matter felt generally about the region of the loins, os pubis, and parts adjacent. This pain is very acute, and almost continual, when the gravel or stone remains at the head of the ureters; but begins to lessen, as it is protruded forwards. Sometimes when the stone is angular, or continues long fixed, the urine is bloody; and, gene-

rally in nephritic obstructions, it is thin, and made in a small quantity, especially at the beginning of the fit. Sometimes there happens a total suppression of it, in which case both the ureters may be obstructed. See ISCHURY.

When the obstructed matter is forced into the bladder, the urine is turbid, and comes away plentifully; and there appears in it much sand, and sometimes small stones; which when angular, are seldom voided without much pain: and when the paroxysm is violent, and of long continuance, there sometimes happens an entire suppression of stool so far, that cathartics lose their force; and sometimes too, though rarely, the terrestrial matter is deposited in such parts where the canals are lax and the circulation languid, so as at the same time to occasion both an arthritic and a nephritic fit. When a stone is lodged in the urethra, the pain generally proves exquisite, but limited to the part, where sometimes the stone will bulge outwards, and may be felt with the fingers.

All paroxysms in case of a confirmed stone, are dangerous. An accumulation of sand in the kidneys or ureters, is less dangerous than a formed stone. A stone in the kidneys is of worse consequence than in the ureters, and more or less so in proportion to its bigness. The largest stone, naturally capable of passing the urethra in men, is supposed to be about the size of a small hazel nut; but in women, one considerably larger may pass the meatus urinarius. When both kidneys, or both ureters, are affected, it is so much the more dangerous, especially if attended with sharp pain, exulceration, inflammation, want of sleep, loss of strength, a fever, suppression of urine, &c. When the symptoms continue many days without intermission, the case is desperate; especially if coldness has seized the extremities, the pulse ticks, and the patient has cold sweats, &c. When the case is habitual or hereditary, or happens in old age or gouty constitutions, it is difficult. The symptoms of bloody urine, continuing after the fit is gone off, prove hard to remove. When the urine is plentifully discharged, has its ordinary sediment, is turbid, and the symptoms decrease, it is a sign the paroxysm is going off. - If a large stone be long detained in the urethra, especially if it be rugged, and can neither be propelled backwards nor forwards, and there be a total sup-

suppression of urine, the case usually proves mortal.

As to the method of cure, it consists in the easy exclusion of the stone, and the preventing the breeding of others. To this purpose, Sydenham recommends bleeding, a posset drink, in which two ounces of marsh-mallow roots have been boiled, and an emollient clyster; after which, he advises a pretty large dose of an opiate; that is, about twenty-five drops of the thebaic tincture, or fifteen grains of the saponaceous pills. And Huxham tells us, that nothing is so efficacious to ease the pain, and promote the descent of the stone through the ureters, as a tepid and emollient bath. Dr. Mead assures us, that it is an error in practice, to give strong forcing diuretics, with a view of driving out the gravel with the urine: whereas this intention is answered with greater safety, in most cases, by relaxing and lubricating medicines; especially if, in case of violent pain, bleeding be premised, and anodynes interspersed. He therefore advises, to give three or four grains of opium, dissolved in five or six ounces of the common decoction, by way of clyster. However, he allows, there are conjunctures, after the pain is abated, when powerful diuretics may be administered; but with this precaution, that as soon as they have had their effect, they are no longer to be continued. All this time the body should be kept open, by giving a turpentine clyster, and sometimes purging gently with an infusion of senna and manna, because strong cathartics are to be avoided. The chief lubricating medicines are oil of sweet almonds, syrup of marshmallows, emulsions made with almonds, and the like; to which may be added the use of the warm bath. Soap and lime-water are also celebrated lithontriptics. See the articles SOAP, LIME, and LITHONTRIPTICS.

Such as have a stone in the bladder, should, while they are taking the fore-said medicines, have four ounces or upwards of tepid oyster-shell lime water injected into the bladder every day; taking care to evacuate their urine before injection, and to retain it as long as they can without pain. And were it not for the trouble of introducing the catheter, the injection might be made at least twice every day; and if a flexible catheter were always kept in the bladder, it might be done at pleasure, and the

dissolution of the largest stone quickly procured. The lime-water will be safer, and yet lose nothing of its virtue, if a dram of starch, or the fourth part of the yolk of an egg, be boiled in six or seven ounces of it.

Those who, though they have no stone in the bladder, are nevertheless frequently troubled with fits of the gravel in the kidneys, may probably put a stop to the disorder, by drinking every morning a pint of oyster-shell lime-water, two or three hours before breakfast. Its disagreeable taste may be mitigated, by adding a very small quantity of new-milk to it: also a dram and a half, or two drams, of juniper berries, infused in every quart-bottle of it, will mend its taste much.

As to the regimen to be observed, Dr. Mead recommends a mild diet, and such as is easy of digestion; and wine and water, mead, or new soft ale, for drink; and gentle exercise, especially riding. See the articles DIET and REGIMEN.

For the several operations in cutting for the stone, or the method of cure by extraction, see the article LITHOTOMY.

STONE also denotes a certain quantity or weight of some commodities. See the article WEIGHT.

A stone of beef, at London, is the quantity of eight pounds; in Herefordshire, twelve pounds; in the north, sixteen pounds.

A stone of wool (according to the statute of 11 Hen. VII.) is to weigh fourteen pounds; yet in some places it is more, in others less; as in Gloucestershire, fifteen pounds; in Herefordshire, twelve pounds.

A stone, among horse-courers, is the weight of fourteen pounds.

STONE, in geography, a market-town, seven miles north of Stafford.

STONE-BLUE, the same with smalt. See the article SMALT.

STONE-CHATTER, in ornithology, the english name of the black motacilla, with a yellow throat and white belly: it is about the size of a linnet, and has a remarkable white spot on each side. See the article MOTACILLA.

STONEHENGE, in antiquity, a famed pile or monument of huge stones on Salisbury plain, six miles distant from that city.

It consists of the remains of four ranks of rough stones, ranged one within another, some of them, especially in the outer-

outermost and third rank, twenty feet high, and seven broad; sustaining others laid across their heads and fastened by mortises: so that the whole must have antiently hung together.

Antiquaries are now pretty well agreed that it was a british temple; and Dr. Langwith thinks it might easily be made probable, at least, that it was dedicated to the sun and moon. Inigo Jones has given a fine scheme of the work, and strives hard to persuade the world, that it was Roman: but Dr. Langwith, who took his measures on the spot, assures us he could by no means reconcile them with that scheme.

STONY LANDS, in agriculture, such as are full of flints, pebbles, or small fragments of free-stone.

These lands, in many places, yield good crops; and the general rule is, that, in cold and stiff lands, the stones should be carefully removed; but, in light and dry lands, it will be advantageous to leave them. However, they always fallow these lands every other year, unless they sow pease upon them; sometimes they sow them with lentils; and when they are quite worn out, they lay them down for clover, or rye-grass.

STONEY-STRATFORD, a market-town of Buckinghamshire, fourteen miles north of Ailesbury.

STOOL, *abovus*, in medicine, an evacuation or discharge of the fæces, &c. by the anus.

Spirit of vitriol, mixed with the patient's drink, is said to be an excellent medicine in case of bloody stools. See the article **DYSENTERY**.

STOOL is also a kind of seat, without a back, much used by artificers, &c. and, among seamen, the rests whereon the poop and top-lanterns stand, are called stools.

STOOMING of wine, is the putting bags of herbs, or other ingredients, into it. See the article **WINE**.

STOOPING, in falconry, is when a hawk being upon the wing, at the height of her pitch, bends down violently to take the fowl. See the articles **FALCONRY** and **HAWKING**.

STOP, in the manege, is a pause, or discontinuance of a horse's motion.

To form a stop, you must, in the first place, bring to the calves of your legs to animate him, bend your body backwards, raise the bridle-hand without moving the elbow, then vigorously extend your hams, and rest upon your stirrups, and make

him form the times or motions of his stop in falcading his haunches three or four times. After stopping your horse, make him give three or four curvets. The opposite term of stop, is parting. In former times, the stop of a horse was called parade.

Half a stop, is a stop not finished, but pefate; so that the horse, after falcading three or four times upon the haunches resumes and continues his gallop, without making pefades or curvets.

STOPS, or POINTS, in grammar. See the articles **POINT** and **PUNCTUATION**.

STOPPER, in a ship, a piece of cable-laid rope, having a wale-knot at one end with a laniard fastened to it; and the other end is spliced round a thimble in the ring-bolts upon deck, and at the bit its use is to stop the cable, that it may not run out too fast; in order to which they make turns with the laniard about the cable, and the wale knot stops it, so that it cannot slip away faster than is necessary.

STORAX, or STYRAX, in natural history and pharmacy, a dry and solid resin, of reddish colour, and a peculiarly fragrant smell, of which there are two kinds, the styrax calamita, or styrax in tears, and the styrax vulgaris, whereof the former is by far the purer and finer kind, imported in small loose granules, or else in large masses composed of such granules: it antiently used to be packed up in reeds for the more secure carriage; whence the name. The common storax is likewise a fine and pure resin, though less than the former; and is brought to us in large lumps, not formed of granules, but of one uniform consistence.

These are the two genuine kinds of storax; but neither of them is that met with in our shops, which is a kind of sawdust connected into lumps, by just so much of the storax-resin as will make the other matters hang together. This is what our apothecaries use, under the name of storax; but it is advisable, to strain carefully the pure resin from the filth, and use no part of the latter.

The two genuine kinds of storax, which ought always to be used where they can be had, differ only in this; that the granulated storax flows naturally from the styrax-tree, and the common kind is obtained from the same tree, by incision. See the article **STYRAX**.

Storax is brought to us from Syria, and the East Indies; and ought to be chosen pure

pure, very fragrant, and of an acid taste. It is much recommended as a detergent and balsamic, in disorders of the breast: it is also esteemed a cordial, and is recommended in vertigos, and other disorders of the head and nerves.

On importation, the storax calamita pays a duty of $11 \frac{62\frac{1}{2}}{100}$ d. the pound; and draws back, on exportation, $10 \frac{20}{100}$ d.

LIQUID STORAX, in pharmacy, is a drug very different from the resin above described; being a resinous juice, of the consistence of venice-turpentine, or thicker: it is, when clean, pellucid, of a brownish colour, with a cast sometimes of reddish, and sometimes of greyish in it. Its smell is somewhat like that of common storax, only much stronger, and even disagreeable: its taste is acrid, aromatic, and somewhat bitterish; and it is oily, or unctuous. It should be chosen thin, pellucid, of a clean brown colour, and of a very strong smell.

There is another coarser and very impure kind, not at all pellucid, and of a grey or brownish colour: its smell is much more languid, and also more disagreeable than that of the pure kind; whereof it seems to be only the dregs, though it is by much the most common liquid storax in the shops.

Petiver gives the most rational account of the origin of liquid storax; which, he says, is prepared from the bark of a tree, called by the Turks rosa mallos, which is frequent in the island Cobras. The bark of this tree being bruised and macerated in sea-water, is boiled to the consistence of bird-lime; they then collect the resinous matter that swims on the top; which, being foul, is boiled again in sea-water, and strained: what passes the bags is the finer, and what remains in them the coarser liquid storax. He adds, that liquid storax is much esteemed in the east, as a perfume. As to its medicinal virtues, they are nearly related to those of turpentine: it is prescribed, internally, as a detergent and diuretic; and externally, to prevent mortifications. The French speak much of the virtues of the ointment called unguentum de styrace, which is thus prepared: melt in five ounces of nut-oil, gum-elemi and yellow wax, of each three ounces and three drams; add of colophony, seven ounces and a half: and when all these are perfectly melted together, add three ounces

and three drams of pure liquid storax; and let the whole be well mixed, and then cool.

STORGE, *στοργή*, a greek term, frequently used for the parental instinct, or natural affection, which almost all animals bear their young; whereby they are most powerfully moved to defend them from dangers, and procure for them suitable nourishment.

STORK, *ciconia*, in ornithology, a species of ardea, with the long wing-feathers black: its general colour is white, which with the black wing feathers makes a very pleasing variegation: the legs are red, very long, and naked a great way up: when it stands erect, it is between three and four feet high; and its body is about the size of a goose.

But besides the common stork, there are two other species of ardea known by the same name, *viz.* the black stork, with the breast and belly white, an erect and beautiful bird, somewhat larger than the common heron; and the brasilian stork, variegated with black and white, much about the size of the common heron. See the articles ARDEA and HERON.

STORM BIRD, or STORM-FISH, *procellaria*, in ornithology. See the article PROCELLARIA.

STORMAR, the south division of Holstein, whereof Hamburg is the chief town.

STORTFORD, a market-town of Hertfordshire, thirty miles north of London.

STOVES, in gardening, are buildings erected for the preservation of tender exotic plants, which, without that assistance, will not bear the cold of our winter, because they require an artificial warmth. Stoves are of two kinds, distinguished by the names of the dry and the bark stoves. The dry stove has the flues, in which the smoak is carried, either laid under the pavement of the floor, or erected in the back part of the house over each other, and returned six or eight times all along the stove. In these stoves the plants are placed on scaffolds, and benches of boards, raised above one another; and the plants, principally preserved in these, are the aloes, cereuses, euphorbiums, ti-thymals, and other succulent plants, which are impatient of moisture in winter, and therefore are not to be kept among trees, or herbaceous plants, which perspire freely.

The bark-stoves are made with a large pit, nearly of the length of the house, which

ral beds or layers of different matters, whereof the body of the earth is composed.

The strata include all the layers of earths, minerals, metals, stones, &c. lying under the upper tegument, or stratum, the turf or mould.

The time when these several strata were laid, was doubtless at the creation; unless, with some great naturalists, as Steno, Dr. Woodward, &c. we suppose the globe of the earth to have been dissolved by the deluge. See DELUGE.

The most frequent opportunities we have of observing these in England, is in the coal-miles; where we find them lying in a regular manner, on what appears to us a plane, as we see any small part of it: but when we consider the same strata, according to the globular figure of the earth, and suppose the mass of the earth to consist of the foregoing, and perhaps in different parts, and at different depths, of strata of ten thousand other kinds, all originally, while in a soft and fluid state, tending towards the center, we shall find that it must mechanically and almost necessarily follow, by the continual revolution of the crude mass from west to East, like the winding up of a jack, or the rolling up of the leaves of a paper-book, that every one of these strata, though they each reach the center, must, in some place or other, appear to the day, or on the surface. In which case there needs no specific gravitation to cause the lightest to be uppermost; and were it practicable to sink to the center of the earth, all the strata that are would be found in every part, and, according to the poet, *ponderibus liberata suis*. Add to this, that, according to an observation of Dr. Stukely, the precipices of all hills are to the westward, whereas the ascent to the east is more gradual.

STRATAGEM, or **STRATEGEM**, in the art of war, any device for the deceiving and surprising an enemy.

STRATEGUS, in grecian antiquity, an annual officer among the Athenians, whereof there were two chosen, to command the troops of the state.

STRATFORD, a market-town, situated six miles south of Warwick.

STRATHNAVER, a subdivision or district of the county of Sutherland, in Scotland, having the Caledonian ocean on the north and west.

STRATIFICATION, in chemistry, the

ranging any thing to be calcined in several layers or strata one above another; which operation is denoted by the abbreviation *f. f.*

STRATIOTES, the **FRESH-WATER-SOLDIER**, in botany, a genus of the polyandria-hexagynia class of plants, the flower of which consists of three obversely cordated erecto-patent petals; the fruit is an oval berry, attenuated at each end, and covered with the cup; it consists of six cells, and contains numerous, oblong, crooked, and, as it were, alated seeds.

STRATTON, a market-town of Cornwall, situated a little south of the Bristol channel, fourteen miles north-west of Launceston.

STRAUBING, a city of Bavaria, situated on the Danube, twenty miles south-east of Ratisbon.

STRAWBERRY, *fragaria*, in botany. See the article **FRAGARIA**.

Strawberry-leaves are somewhat styptic and bitterish; and hence may be of some service in debility and laxity in the viscera, and immoderate secretions: they are also recommended in hæmorrhages and fluxes. The fruit is very grateful both to the palate and stomach, abating heat, quenching thirst, loosening the belly, and promoting urine.

STRAWBERRY-TREE, *arbutus*, in botany. See the article **ARBUTUS**.

STRAY, or **ESTRAY**, in law. See the article **ESTRAY**.

STREAM-ANCHOR. See **ANCHOR**.

STRENÆ, in antiquity, presents made on new-year's day, as a happy augury for the ensuing year.

STRENGTH, *vis*, in physiology, the same with force. See **FORCE** and **POWER**.

The strengths of different animals of the same species, or of the same animal, at different times, are demonstrated to be in a triplicate proportion of the quantities of the mass of their blood; the whole strength of an animal is the force of all the muscles taken together; therefore, whatever increases strength, increases the force of all the muscles, and of those serving digestion as well as others. See **MUSCLE**. Notwithstanding the strengths of the same animal at different times, or of different animals of the same species, are in proportion to the quantities of the mass of their blood, yet the quantity of the blood may be increased in such circumstances, as to abate the strength. The equilibrium

um between the blood and the vessels being destroyed, wonderfully lessens the strength. The sudden suppression of perspiration, though it increases the quantity of the blood, as it most considerably does by Sanctorius's calculation, yet it lessens the strength, because the retained matter, being what ought to be evacuated, so alters the texture of the blood, as to make it unfit for muscular motion. See the article PERSPIRATION, &c.

Bellini proves, that if the blood be so vitiated, as to increase or diminish strength, it amounts to the same, as if the blood were in a natural state, but its quantity increased or diminished in the same proportion; so that the blood, when vitiated, may so impair the strength of the muscles, as even to spoil digestion; and yet, in some cases, it may be so vitiated, as to help digestion, and increase strength. See BLOOD, MUSCLE, &c.

M. de la Hire, in a calculation of the strength of a man in drawing and bearing, shews, that the strength of an ordinary man, walking in an horizontal direction, and with his body inclining forwards, is only equal to twenty-seven pounds, which is much less than one would have imagined. He adds, that this force would be much greater, if the man were to walk backwards; and that it is for this reason, the watermen fetch their oars from before backwards. It is known, by experience, that a horse draws horizontally as much as seven men, consequently his strength must be 189 pounds. A horse, as to pushing forwards, has a great advantage over a man, both in the strength of its muscles, and the disposition of its whole body; but the man has the advantage over the horse in ascending. M. de la Hire shews, that three men, laden with 100 pounds a piece, will ascend a pretty steep hill with more ease and expedition than a horse laden with 300 pounds.

Dr. Desaguliers shews, from a variety of experiments, that pretended feats of strength is wholly owing to art, and accounts for them as not exceeding the power of any man of moderate strength. See Desaguliers's Experimental Philosophy, vol. I. page 265, seq.

For the manner of calculating the strength of timber, see the article TIMBER.

For the strength of spirits, see the articles PROOF, BRANDY, &c.

STRENGTHENERS, in pharmacy, medicines that add to the bulk and firmness of the solids: and such are all aborvent,

agglutinant, and astringent medicines. See the articles ABSORBENTS, AGGLUTINANTS, and ASTRINGENTS.

Medicines of this kind are of great service in hectics, consumptions, and the like disorders.

STRILÆ, in the antient architecture, the same with the flutings of columns. See the article FLUTES.

Among naturalists, the term striz denotes the small channels and ridges in scollop-shells, &c.

STRIATED LEAF, among botanists, one that has a number of longitudinal furrows on its surface.

STRICTOR, in anatomy, the same with constrictor and sphincter. See the articles CONSTRICTOR and SPHINCTER.

STRIGONENSIS TERRA, *earth of Strigonium*, in the materia medica, a red earth, of the bole kind, found about the gold-mines at Strigonium in Hungary, and used in some places as an astringent and sudorific. See the article BOLE.

The characters by which it is known from the other earths are these: It is but of a coarse and impure texture, and lighter than most of the boles in colour; it is of a strong, but dull red, and is of a tolerably smooth surface; it is apt to crumble to pieces between the fingers, and stains the skin in handling; it melts freely in the mouth, and has a remarkable smoothness, but very little astringency in its taste, and leaves a sensible grittiness between the teeth; it is sometimes veined and spotted with small molecule of an earth, like the whitish variegations of the red french bole.

STRIKE, a measure of capacity, containing four bushels. See MEASURE.

STRIKE, among seamen, is a word variously used: when a ship, in a fight, or on meeting with a ship of war, lets down or lowers her top-sails, at least half-mast-high, they say she strikes, meaning she yields, or submits, or pays respect to the ship of war. Also, when a ship touches ground, in shoal-water, they say she strikes. And when a top-mast is to be taken down, the word of command is, strike the top-mast, &c.

STRING, or CHORD, in music. See the article CHORD.

STRIX, the OWL KIND, in ornithology, a kind of birds, with four toes on each foot; three of which stand forward, and the other backward.

To this genus belong the bubo, or great horned owl, the scops, &c. See the articles BUBO, SCOPS, &c.

STROBILUS, among botanists, a kind of pericarpium, formed of a number of vaginæ, with contorted points applied close to one another. See **PERICARPIUM**.

STROMATEUS, in ichthyology, a genus of fishes of the malacopterygious, or soft-finned, kind, the characters of which are these: the body is very much compressed, and very broad and thin; it has no belly-fins, and has only one back-fin, which is extended over the whole back. The only known species of this genus is the callichthys of authors, a fish called the fiatola at Rome: the tail of which is very forked; the mouth is very small; the teeth are placed in the jaws and palate; and the tongue is smooth and broad: the body is striped cross-ways.

STROMBOLI, one of the Lipari-islands, fifty miles north of Messina.

STRONGOLI, a town of the hither Calabria, in the kingdom of Naples, situated on the gulph of Taranto.

STROPHE, in ancient poetry, a certain number of verses, including a perfect sense, and making the first part of an ode. See the article **ODE**.

STROUD, a market-town, nine miles south of Gloucester.

STRUMÆ, scrophulous tumours arising on the neck and throat, constituting what is commonly called the king's evil. See the article **SCROPHULA**.

STRUTHIO, the **OSTRICH**, in ornithology. See the article **OSTRICH**.

STRYCHNUS, in botany, a genus of the pentandria monogynia class of plants, with a monopetalous flower, quinquefid at the limb; its fruit is a very large and smooth unilocular berry, full of a pulpy matter, and containing orbiculated seeds, with hairs radiated from their edges.

STRYMON, or **AMPHIPOLIS**. See the article **AMPHIPOLIS**.

STUC, or **STUCCO**, in building, a composition of white marble, pulverised and mixed with plaster of lime; and the whole being sifted and wrought up with water, is to be used like common plaster: this is what Pliny means by *marinoratum opus*, and *albarium opus*.

STUFF, in commerce, a general name for all kinds of fabrics of gold, silver, silk, wool, hair, cotton, or thread, manufactured on the loom; of which number are velvets, brocades, mohairs, sattins, taffeties, cloths, serges, &c. See the articles **VELVET**, **BROCADE**, &c.

STULINGEN, a town of Swabia, in Germany, 35 miles west of Constance.

STUL-WEISSENBURG, a city of Lower Hungary, 36 miles south-west of Buda.

STUM, in the wine-trade, denotes the unfermented juice of the grape, after it has been several times racked off, and separated from its sediment. The casks are, for this purpose, well matched, or fumigated with brimstone every time, to prevent the liquor from fermenting, as it would otherwise readily do, and become wine. See the article **MATCHING**.

It is this fume of the sulphur from the match, that prevents, in this case, all tendency to fermentation, and continues the natural juice of the grape in a sweet state, fit to be readily mixed with wines instead of sugar; for which purpose it is very much used in Holland, and some other countries; as also for giving a new fret, or briskness to decayed wines: so that very large quantities of this stum are annually imported to all parts, along with the foreign wines. And after the same manner a stum is prepared in England, from the juice of apples, which serves the ordinary purposes of the wine-cooper. In the preserving this liquor in this state, we see the vast use of brimstone, for it could never be done otherwise than by the matching of the casks.

Dr. Shaw gives the following method of preparing an artificial stum, nothing inferior to the natural; and as fit for the re-fermenting, fretting, improving, or making of wines, vinegars, and spirits. Take three pound of fine lump-sugar, or such as has been well refined from its treacle; melt it in three quarts of water, and add, in the boiling, of rhenish tartar, finely powdered, half an ounce; this dissolves with a remarkable ebullition, and gives a grateful acidity to the liquor: take the vessel from the fire, and suffer it to cool, and you have an artificial must, which in all respects resembles the natural taste and sweet juice of a white flavourless grape, when well purified, and racked off from its sediment, in order to make stum. If this artificial must be stummed, that is, well fumigated with burning brimstone, it becomes a perfect stum, and may be made of any flavour, at the discretion of the artist.

STUNG, or **ADDER-STUNG**. See the article **ADDER**.

STUPEFIERS, in medicine, the same with narcotics and opiates. See the articles **NARCOTICS** and **OPIATES**.

STU-

STUPOR, a numbness in any part of the body, whether occasioned by ligatures obstructing the blood's motion, by the palsy, or the like.

STUPHA, or **STUPE**, in medicine, is a piece of cloth dipped in some proper liquor, and applied to an affected part, by way of fomentation or epithem. See the articles **FOMENTATION** and **EPITHEM**.

STURGEON, *sturio*, in ichthyology, a species of accipenser, with the body armed with rough tubercles. See the article **ACCIPENSER**.

The sturgeon is a very large fish, growing to fourteen, sixteen, or eighteen feet in length; though the greater part are caught much smaller. There are four cirri at the extremity of the under jaw; the eyes are large, and stand at a great distance from the extremity of the rostrum or snout: but what is very singular in the sturgeon, is the spinose tubercles, of which there are several series or rows. See plate **CCLXII.** fig. 4.

STURMINSTER, a market-town, eighteen miles north of Dorchester.

STURNUS, the **STARLING**, in ornithology. See the article **STARLING**.

STUTGART, a city of Swabia, situated on the river Neckar, in east long. 9°, and north lat. 48° 40'.

STYE, or **STITHE**, a disorder of the eyelids; being a small encysted tumour, about the bigness of a barley-corn.

The sty frequently occasions much pain and uneasiness, and must be treated with great caution, on account of the tenderness of the eye. Some recommend cataplasms, and the like applications, to these; but the eye is often hurt by those applications, and it is observed besides, that these turbercles seldom give way to topical applications of any kind.

When they are small, Heister thinks it best to let them take their own course; but if so large as to occasion deformity or danger of hurting the sight, the way to extirpate them, is to make a longitudinal incision on the part, and carefully take them out whole; or, if it cannot be thus got out clean, it must be cut out, as far as may be done, with scissars, and dressed with egyptian ointment, and a little red precipitate, or touched at times with the common caustic, till eaten thoroughly away, and then the wound dressed and healed in the common manner.

This is the method by which the flat and broad bottomed tumours of this kind are

to be extirpated; and in this, great care must be taken that none of the sharp applications touch the eye, as they might injure the sight. It is common, however, with these tumours to hang by a sort of small root, and then they are much more easily managed, there being no more necessary than the cutting them close off, with a pair of scissars, or the tying them firmly round with a piece of silk or horse-hair. They are sometimes, if taken in time, dispersed by rubbing them with fasting spittle, or by applying the pulp of a roasted apple mixed with some saffron and camphor.

STYGIAN LIQUORS, an appellation given to caustic and corrosive waters, and particularly to aqua regia. See **AQUA**.

STYLE, a word of various significations, originally deduced from *στυλο*, a kind of bodkin, wherewith the antients wrote on plates of lead, or on wax, &c. and which is still used to write on ivory-leaves, and paper prepared for that purpose, &c.

Lapidary's **STYLE**. See **LAPIDARY**.

STYLE, in dialling, denotes the gnomon or cock of a dial, raised on the plane thereof, to project a shadow. See the articles **DIAL** and **GNOMON**.

STYLE, in botany, is a part of the pistil of plants, and is of various figures, but always placed on the germen: it gives origin to the stigma. In some plants it is extremely short, and in others it seems entirely wanting. See the articles **PISTIL**, **STIGMA**, and **GERMEN**.

STYLE, in matters of language, a particular manner of expressing one's thoughts agreeably to the rules of syntax; or, as F. Buffier more accurately defines it, the manner wherein the words, constructed according to the laws of syntax, are arranged among themselves, suitably to the genus of the language.

From this description it appears, that the style supposes, or includes the syntax; and that syntax does not extend so far as style, for the syntax may be just, where the style is wretched. A fault in style is not less a fault against grammar, than is a fault in syntax; only the former is less precise and palpable than the latter. A very common error in grammarians, F. Buffier adds, is to confound two kinds of styles in one: grammatical style, or that directed by the rules of grammar; and the personal style, which depends less on the grammar than on the person that writes, whether with regard to his particular taste and genius, or with regard to

his

his matter, or the kind or character of his work. There are a great many differences between the two; the most essential is, that the one may be diversified an infinite number of ways, and the other cannot. In effect, the personal style is naturally variable, according to the different genius, humours, and complexions.

It is the imagination that acts, that conceives, that proposes, and that expresses things, according to its character, which is different in all men, and which is to be varied according to the particular kind of the work. Hence arise the gay, the grave, the florid, the jejune, the copious, the concise, the poetical, the epistolary, and the burlesque styles. These personal styles are all independent on the grammatical; and we have authors who excel in the one, and are miserably defective in the other. The personal style is not under the direction of grammar, but of the imagination, or rather of rhetoric, that art having to do directly with our thoughts, as grammar with our words. This, however, may be said, that grammar is far from being able to vary the same words of a phrase, with equal perfection; and that there is but one way of delivering them in the taste and genius of the language.

In oratory and poetry, style is restrained wholly to what F. Buffier calls the personal style. Language refers principally to the matter of the discourse, *viz.* the words; elocution to the particular members or parts thereof; and style to the whole composition. The matters of the art reduce the kinds of style to three; the sublime, the low, and the intermediate or equable style. The sublime style is that consisting in magnificent words and sentences; which, by its noble boldness, ravishes the hearers, and extorts admiration, even from the unwilling. See the article **SUBLIME**.

Low or simple style is that ordinarily used in smaller and humbler works, as epistles, dialogues, and common discourse. The chief virtues hereof are perspicuity, smoothness, easiness, and cleanliness. It must be very sparing in the use of tropes and figures, especially the more violent ones, as the *protopopœia*, *apostrophe*, &c. See the article **PROPOPOEIA**, &c.

Intermediate or equable style partakes of the magnificence of the sublime, and the simplicity of the low. It neither rises to the majesty of the one in words and sentences, nor yet is smartly pointed like the

other. Tully calls this the polished and florid style; it being in this that all the graces and beauties of language are principally to be used.

As to the choice of style in the general, the nature of the subject is to determine it. Such style, says Cicero, is to be chosen as expresses great things magnificently, middle things moderately, and low things subtilly; but more particularly as there are three branches of the duty of an orator, to teach, to delight, and to move; the simple style is used to teach, the middle to delight, and the sublime to move. Again, the simple or low style is fit for comedy, the sublime for tragedy, and the middle for history. Again the simple style is fit for bucolics and eclogues, the intermediate for georgics, and the sublime for epics: which triple difference we may discern in Virgil, though he sometimes mixes them all in the *Æneid* itself, using the simple style in the fifth book, where he describes games; and the intermediate in the beginning of the poem. Care is still to be taken that the style be not flat and dull, on pretence of being simple.

The chief faults in style are its being tumid and swollen, or cold and puerile, or stiff, or loose, or dry and jejune. A tumid style is that immoderately stuffed with big words and sentences. Frigid or puerile style is that which affects certain trifling ornaments, insipid jests, remote and strained allusions, redundant descriptions, &c. Loose style is that which, wanting articles, numbers, &c. fluctuates here and there, not connected or joined together. Dry jejune styles, is that which is destitute of ornament, spirit, &c.

The ancients made a notable distinction of styles into Laconic and Asiatic: Laconic style is distinguished by its exceeding conciseness, and by comprehending a deal of matter under a few words: Asiatic style, on the contrary, is that which is very diffusive and prolix, or where abundance of words are used to express a little matter.

STYLE, in jurisprudence, the particular form, or manner of proceeding in each court of jurisdiction, agreeable to the rules and orders established therein: thus we say the style of the court of Rome, of Chancery, of Parliament, of the Privy-council, &c.

STYLE, in music, denotes a peculiar manner of singing, playing, or composing; being

being properly the manner that each person has of playing, singing, or teaching; which is very different both in respect of different geniuses, of countries, nations, and of the different matters, places, times, subjects, passions, expressions, &c. Thus we say the style of Palestrina, of Lully, of Corelli, of Handel, &c. the style of the Italians, French, Spaniards, &c. The style of gay pieces of music is very different from that of serious ones; and the style of church music is very different from theatrical music. The style of the Italian compositions is poignant, florid, expressive: that of the French compositions, natural, flowing, tender, &c. Hence the various epithets given to distinguish the various characters; as the ancient and modern styles; the Italian and German styles; the ecclesiastical and dramatic styles; the gay, the grave, majestic, natural, soft, familiar, gallant, low, sublime styles, &c.

The style recitativo, or dramatico, in the Italian music, is a style fit to express the passions: the style ecclesiastico, is full of majesty, very grave, and fit to inspire devotion: style motetico, is a various rich, florid style, capable of all kinds of ornaments, and of consequence fit to express various passions, particularly admiration, grief, &c. style madrigalesco is a style proper for love, and the other softer passions: style hyperchematico is a style proper to excite joy, mirth, and dancing, and consequently full of brisk and gay motions: style symphonico, is a style fit for instrumental music: but as each instrument has its peculiar effects, there are as many different symphonical styles: the style of the violin, for instance, is usually gay; that of the flutes, melancholy and languishing; that of trumpets, sprightly and animating: style melismatico is a natural artless style, which any body almost may sing, fit for airs and ballads: style fantastico, is an easy humorous manner of composition, free from all constraints, &c. style choraico, a style that is proper for dancing, and is divided into as many different kinds as there are different dances; as the style of farabands, minuets, gavots, jiggs, rigadoons, chacones, &c.

STYLE, the Julian manner of computing times, as the

no-STYLE is the Gregorian method of computation. See the articles JULIAN, GREGORIAN, BISSEXTILE, &c.

STILET, or STILETTO, a small dan-

gerous kind of poinard, which may be concealed in the hand, chiefly used in treacherous assassinations. The blade is usually triangular, and so slender that the wound it makes is almost imperceptible. The stilet is prohibited in all well-disciplined states.

STYLITES, an appellation given to a kind of solitaries, who spend their lives seated on the tops of columns, to be, as they imagine, the better disposed for meditation, &c. Of these we find several mentioned in ancient writers, and even as low as the eleventh century. The founder of the order was St. Simon Stylites, a famous anchorite in the fifth century, who took up his abode on a column six cubits high; then on a second, of twelve cubits; a third, of twenty-two; and, at last, on another of thirty-six. The extremity of these columns were only three feet in diameter, with a kind of rail or ledge about it that reached almost to the girdle, somewhat resembling a pulpit. There was no lying down in it. The fakirs, or devout people of the east, imitate this extraordinary kind of life even to this day.

STYLOGLOSSUS, in anatomy, a muscle arising from the apex of the styloide process; and, descending obliquely to the side and root of the tongue, moves it sideways, backwards and forwards.

STYLOHYOIDÆUS, in anatomy, a pair of muscles arising in the styloide process, and terminating in the horn and the base: this is often perforated by the digastric muscle of the jaw. These muscles draw laterally upwards.

STYLOIDES, in anatomy, an apophysis of the os petrosus, thus called from its resembling a style or stilet.

STYLOPHARYNGÆUS, in anatomy, one of the six pair of muscles which serve to dilate the pharynx. See the article PHARYNX.

The stylopharyngæus arises from the beginning of the styloide process, and is inserted on both sides into this and into the thyroide process: it serves also to elevate as well as dilate the pharynx.

STYPTIC, *stypticus*, in pharmacy, medicines which, by their astringent qualities stop hæmorrhages. See the article HÆMORRHAGE.

When a considerable hæmorrhage is stopped by absorbents or styptics, it is always produced by means of a clot of blood, secured by compression, so that the ori-

fices

fice of the vessel is stopt. This clot generally consists of two parts, the one without, and the other within, the vessel: that without is formed by the last flowing blood, which, in coagulating, incorporates itself with the lint, moss, or powders, used for stopping the blood: the other part of the clot within the vessel, is only that portion of the blood which was ready to be discharged when the vessel was stopped. These two parts are often but one continued clot. That without the vessel performs the office of a covering, whilst that within serves as a kind of stopper. Alcohol, or pure spirit of wine, is the most usual, and perhaps the best, styptic; and is the basis of most of the celebrated arcana for stopping hæmorrhages. Boerhaave says it becomes an immediate styptic, as it prevents putrefaction, and occasions a thin but very solid eschar. For if pledgits be dipped in pure alcohol, made hot, and applied to a bleeding wound, if it be closely compressed upon the part, and covered with a piece of bladder lightly besmeared with oil, and kept on with a proper bandage, the hæmorrhage presently ceases, and the whole dressing may continue unremoved for three days, in which time the vessels are usually closed and strongly contracted and consolidated, by means of the alcohol.

The styptic powder of Helvetius is a medicine said to be serviceable in uterine hæmorrhages, either to correct the too frequent return of the menses, or their too great abundance; also to stop the flooding to which women with child are subject, and to moderate the flow of the lochia. It is also found to have very surprizing good effects in the fluor albus. It is a composition of alum and dragon's-blood: and in the Edinburgh Dispensatory, two parts of alum are directed to be made into powder with one of the dragon's-blood: others use equal parts of both. Heister recommends this powder or alum alone, with a decoction of linseed.

Eaton's styptic is famous for curing fresh wounds in a very small time, and immediately stopping their bleeding: but Dr. Sprengel is said to prove, beyond all possibility of doubt, that this is in effect no other than the styptic of Helvetius.

The female agaric has been of late greatly celebrated as a styptic, and is said to restrain not only the venal but arterial

hæmorrhages, without the use of ligatures. See the article AGARIC.

STYRAX, STORAX, in botany, a genus of the icotandria-monogynia class of plants: the corolla whereof is monopetalous and funnel-shaped: the tube is cylindric, and no longer than the cup: the fruit is roundish drupe, having only one cell: the seeds are two roundish acuminate nuts, convex on one side and plane on the other. This tree is a native of several parts of Europe and of the east: the latter part of the world it affords the fragrant resin called styrax, on wounding its trunk: for the virtues, &c. whereof see the article STORAX.

SUANA, or SOVANA, a town of Italy, in the dutchy of Tuscany, and province of Sienna: situated on the confines of the dutchy of Castro, fifty miles south of Sienna.

SUB, a latin preposition, signifying *under* or *below*, frequently used in composition in our language; thus, 1. Sub-brigadier is an officer in the cavalry who commands under the brigadier, assisting him in the discharge of his office. 2. Sub-chantor, an officer in the choir, who officiates in the absence of the chantor. 3. Sub-deacon, an antient officer in the church that was made by the delivery of an empty platter and cup by the bishop and of a pitcher, basin, and towel to the arch-deacon. His office was to wait on the deacon with the linen where the body, &c. was consecrated, and receive and carry away the plate with the offerings at the sacraments, and the cup with the wine in it, &c. 4. Sub-dean, a dignity in some chapters beneath the dean. 5. Sub-marshal, an officer of the Marshalsea that is deputy to the chief marshal of the king's house, who is commonly called knight-marshal, and has the custody of the prisoners there. Sub-prior, a claustral officer who assists the prior, &c. See BRIGADIER, CHANTOR, DEACON, DEAN, &c.

SUBALTERN, a subordinate officer, one who discharges his post under a command, and subject to the direction of another: such are lieutenants, sub-lieutenants, coronets and ensigns, who serve under the captain; but custom has appropriated the term to those of much lower ranks, as serjeants; and the like. We also say subaltern-courts, jurisdictions, &c. such are those of inferior lords, with regard to the lord paramount.

mount; hundred courts, with regard to county-courts, &c.

SUBBUTEO, in ornithology, the yellow-legged falco, with the head brown, and the shoulders and belly white. See the article **FALCO**.

SUBCLAVIAN, *subclavius*, in anatomy, is applied to any thing under the arm-pit or shoulder, whether artery, nerve, vein, or muscle.

Subclavius more particularly denotes a small oblong muscle lying between the clavicle and first rib. It is fixed by one end in all the middle lower portion of the clavicle, at the distance of about an inch from each extremity, and by the other in the cartilage, and a small part of the bone of the first rib.

SUBCONTRARY POSITION, in geometry, is when two similar triangles are so placed as to have one common angle V, (plate CCLXII. fig. 7) at the vertex, and yet their bases not parallel. If the scalenous cone, BVD, be so cut by the plane CA, as that the angle at C = the angle at D, the cone is then said to be cut subcontrarily to its base BD.

SUBCOSTAL MUSCLES, *subcostales*, in anatomy. These muscles are fleshy planes of different breadths, and very thin, situated more or less obliquely on the inside of the ribs, near their bony angles, and running in the same direction with the external intercostals. They are fixed by other extremities in the ribs, the inferior extremity being always at a greater distance from the vertebræ than the superior, and several ribs lying between the two insertions. These muscles are more sensible in the lower ribs than in the upper, and they adhere closely to the ribs that lie between their insertions.

SUBCUTANEUS, in anatomy, a thin membranous muscle, running under the skin, called also quadratus genæ, and platisma myoides. It arises with a pretty broad origin from the hind part of the neck, and from the pectoral muscle below the clavicle. It adheres firmly to the panniculus carnosus, from which it is not separated without difficulty, and therefore it was not antiently distinguished from it. It is inserted obliquely on each side into the lower jaw-bone, near the skin, lips, and sometimes the bottom of the nose, all which parts it draws downwards and awry. A convulsion herein is called the cynic spasm. In some persons it reaches to the ears, which is the reason

that some have the faculty of moving their ears which others want.

SUBCUTANEOUS GLANDS, in anatomy. See the article **GLAND**.

SUBDUCTION, in arithmetic, the same as subtraction. See **SUBTRACTION**.

SUBDUPLICATE RATIO, is when any number or quantity is contained in another twice; thus 3 is said to be subduple of 6, as 6 is duple of 3.

SUBDUPLICATE RATIO of any two quantities is the ratio of their square roots. See the article **RATIO**.

SUBER, the CORK TREE, in botany, a species of quercus. See the article **OAK**.

SUBJECT, *subditus*, a person under the rule and dominion of a sovereign prince or state.

SUBJECT, *subjectum*, is also used for the matter of an art or science, or that which it considers, or whereon it is employed; thus the human body is the subject of medicine. In this sense the anatomists call the body they are dissecting, and whereon they read lectures, their subject. The subject of logic is thinking or reasoning; but more particularly in a syllogism one of the terms of a proposition is called the subject, and the other the attribute. In poetry, the subject is the matter treated of, or the event related or set to view. Subject also denotes the substance or matter to which an accident is added, whence the maxim that two contraries can never subsist in the same subject.

SUBJECT, in the manege. To keep the horse subject, is an expression relating to colts, signifying to keep the croupe of the horse in the round so that it may not slip out; that he may not transverse; and that he may work, in the manege, croupe in, marking his equal times, without losing his ground.

SUBJECT, in music. See **SOGETTO**.

SUBJUNCTIVE, in grammar, the second mood of verbs, thus called because subjoined to another verb, or particle at least, and not standing alone in a sentence: thus *Orat ut ad se venias. Quid faciam prorsus ignoro. Though this were true, &c.* See the article **MOOD**.

SUBLIMABLE BODIES, a term used by some of our chemical writers to express such substances as are capable of sublimation in a dry form. See the article **SUBLIMATION**.

SUBLIMATE, a chemical preparation, the basis whereof is mercury or quicksilver.

silver. There are two kinds of sublimate, corrosive sublimate and sweet sublimate, or *mercurius dulcis sublimatus*, which see under *MERCURY*.

SUBLIMATION, the condensing and collecting in a solid form by means of vessels aptly constructed, the fumes of bodies raised from them, by the application of a proper heat. Sublimation is in all respects the same with distillation, except that in the first the produce is solid, but in the latter fluid. The only variation therefore necessary in the operation, is the accommodating the recipient part of the apparatus to this difference, which admits, in most cases, that one vessel may perform the office both of condenser and receiver, as the matter cannot, like fluids, flow to another part, but must remain where it first settles, except in some instances where the matter is extremely volatile, or where a fluid rising with it renders a depending receiver necessary. See *DISTILLATION*.

The vessels proper, in respect of the different subjects of this operation, vary in their structure and the substance of which they are made, as well on account of the degree of heat requisite to be employed, as the nature of the matter to be sublimed, since corrosions of them are here, and indeed in all other cases, to be carefully avoided. In sublimations of mercury, whether combined with acids or sulphur, of sal ammoniacum and of sulphur alone, a single vessel may answer all the purposes, as their necessity of a great heat to keep them in the condition of fumes renders the upper part of the glass capable of detaining them when they are raised thereto; but it is proper, in these instances, that a glass in sand, or earthen ware should be used. A glass body, in a strong sand heat, may very well serve for all these; but sublimate of mercury is frequently sublimed in a bolt-head, or matrafs; and the facitious cinnabar, by those who make large quantities, in an earthen vessel made in the shape of an egg. In the sublimation of volatile salt of amber, and flowers of benjamin, a container and condenser are separately necessary, and may in all these cases be extremely well supplied by a retort and receiver, though bodies with alembic heads, and receivers of glass fitted to them, have been generally recommended in several of them; but the trouble of luting two junctures, and the difficulty of fitting them to each other,

with several other reasons, make retorts far more convenient. A retort and receiver are likewise proper in the case of cinnabar of antimony; for though the cinnabar might be restrained in one glass, the butter of antimony makes the receiver necessary.

In sublimations of facitious cinnabar, mercury sublimate, and sal-ammoniacum it is sufficient to cover the aperture or neck of the vessel with a tile; and in the sublimation of cinnabar of antimony, and flowers of benjamin, in retorts, it is unnecessary to lute on the receiver; but in the sublimation of volatile salts, it is requisite to lute the vessels as secure as possible, leaving only a small vent till they attain the greatest heat they are to suffer during the operation.

The requisite degree of heat in sublimation varies in almost every different subject of the operation. The limits are from the greatest degree that can be given in sand, to a degree something less than that which will make water boil. See the article *HEAT*.

Hoffman observes, that only those things are sublimable which contain a dry exhaleable matter in their original construction, and among these is found a great variety, which require various methods and means to execute that effect. Among the minerals, sulphur, antimony, and orpiment, are named as the principal sublimable bodies: these are of a very lax compage or structure, and easily raised by fire in small particles, which concrete again on being stoppt from flying off by the cover of the vessel; while, on the contrary, iron, silver, and the other metals being of a closer structure, remain fixed in the greatest heat, and never ascend without being mixed with some volatile substance that is of itself capable of rising and taking up some of them with it. Thus copper and iron will be raised in sublimation by means of sal ammoniac mixed with them; and even gold itself is said to be subject to the same law; Mr. Boyle assuring us that he had a secret method of preparing a certain saline substance, by means of a very small admixture of which, gold would be made to rise in sublimation, and form fine purple crystals. The admixtures which make bodies sublimable that are not so in themselves, are to be of various kinds, according to the nature of the body to be sublimed. Among these, some act by rendering the body more easily fusible,

fusible, and disuniting those particles more readily which the fire is expected to carry up: others act again by preventing the cohesions of the particles of the substance to be sublimed, which heat would otherwise occasion: and, finally, others, by entering the body of the fixed substance they are mixed with, and giving wings, as it were, to its subtle particles, so that they may ascend with its easily sublimable matter, and join with it in the formation of one mixed substance in the top of the vessel, by partaking of the nature of both. Others act potentially in the same way, but by different means, themselves not being capable of sublimation, but acting on the substance to be sublimed, by enervating, weakening, or absorbing those substances, or parts, of the mixed body, which would otherwise have prevented the ascent of the rest: and, finally, some act as dissolvents only, and by that means render things easy of sublimation, which would have been very difficultly so, while their parts were in a more strict continuity.

SUBLIME, in discourse, is defined by Boileau, to be something extraordinary and surprising, which strikes the soul, and makes a sentiment or composition ravish and transport.

From this definition it appears, that the sublime is a very different thing from what the orators call the sublime style. The sublime style necessarily requires big and magnificent words; but the sublime may be found in a single thought, a single figure, a single turn of words. A thing may be in the sublime style and yet not be sublime; that is, it may have nothing extraordinary and surprising. See the article **STYLE**.

Longinus makes five sources of the sublime: the first a certain elevation of the mind, which makes us think happily: the second is the pathetic, or that natural vehemence and enthusiasm which strikes and moves us; these two are wholly owing to nature, and must be born with us; whereas the rest depend partly on art: the third is the turning of figures in a certain manner, both those of thoughts and of speech: the fourth, nobleness of expression; which consists of two parts, the choice of words, and the elegant figurative diction: the fifth, which includes all the rest, is the composition and arrangement of the words in all their magnificence and dignity.

SUBLINGUAL GLANDS, in anatomy,

two glands under the tongue, placed one on each side thereof. These, called also hypoglossides, filtrate a serous humour of the nature of saliva, which they discharge by little ducts near the gums into the mouth. See **GLAND**.

SUBMULTIPLE, in geometry, &c. A submultiple number, or quantity, is that which is contained a certain number of times in another, and which therefore, repeated a certain number of times, becomes exactly equal thereto: thus 3 is a submultiple of 21; in which sense submultiple coincides with an aliquot part. See the article **ALICQUOT part**.

SUBMULTIPLE RATIO, is that between the quantity contained and the quantity containing: thus the ratio of 3 to 21 is submultiple. In both cases submultiple is the reverse of multiple, 21, *e. g.* being a multiple of 3, and the ratio of 21 to 3 a multiple ratio. See **RATIO**.

SUBNORMAL, in geometry, a line which determines the point in the axis of a curve, where a normal, or perpendicular, raised from the point of contact of a tangent to the curve, cuts the axis. Or the subnormal is a line which determines the point wherein the axis is cut by a line falling perpendicularly on the tangent in the point of the contact: Thus *TM* (plate *CCLXII. fig. 6.*) being a tangent to a curve in *M*, and *MR* a normal or perpendicular to the tangent, the line *PR* intercepted between the semiordinate *PM*, and the normal *MR*, is called the subnormal. Hence 1. in a parabola as *AM*, &c. the subnormal *PR* is to the semi-ordinate *PM*, as *PM* is to *PT*, and *MR* to *TM*. 2. In the parabola the subnormal *PR* is subduple the parameter, and, consequently, an invariable quantity.

SUBORDINATION, a relative term, expressing the degree of inferiority between one thing and another.

SUBORNATION, a secret or under-hand preparing, instructing, or bringing in a false witness; or corrupting or alluring a person to do such a false act. Hence, subornation or perjury is a corrupting or enticing a person to perjury. See the article **PERJURY**.

Persons suborning a witness to give false evidence, are liable to 40 l. forfeiture, or to be imprisoned for half a year, stand on the pillory, &c.

SUBPOENA, in law, a writ whereby all common persons, or those under the degree of peerage, may be called into chan-

united into one conception, and signified by one name : for there are no things so remote, which the mind cannot, by this art of composition, bring into one idea ; as is visible in that signified by the name universe. See COMPOSITION.

SUBSTANTIAL, in the schools, something belonging to the nature of substance.

It is generally disputed, whether or no there be such things as substantial forms ? *i. e.* forms independent of all matter ; or forms that are substances themselves.

Substantial is also used in the same sense with essential, in opposition to accidental.

SUBSTANTIVE, in grammar, a noun, or name, considered simply and in itself, without any regard to its qualities, or other accidents, in contradistinction to the noun termed adjective, or that which expresses a certain quality or accident of the noun substantive. Or, a noun substantive is that noun, which joined to a verb, makes a perfect sentence, as *a man, a horse, a tree* ; thus, *a man laughs, a horse gallops, a tree buds*, are each of them perfect sentences. All nouns, to which one cannot add the word *thing*, are substantives ; and those to which *thing* may be added, are adjectives. See the articles NOUN, ADJECTIVE, and VERB. Substantives are divided into proper and appellative. See the articles PROPER and APPELLATIVE.

SUBSTANTIVE VERB. See VERB.

SUBSTITUTE, a person appointed to officiate for another, in case of absence or other legal impediment.

SUBSTITUTE, in medicine, denotes a drug or remedy that may be used instead of another ; or that supplies the place of another, of like virtue, which is not perhaps to be had : called also succedaneum.

SUBSTITUTION, in grammar, the using one word for another. This the grammarians otherwise call syllepsis.

SUBSTITUTION, in the civil-law, a disposition of a testament, whereby the testator substitutes one heir for another, who has only the usufruct, and not the property of the thing left him. Substitution is only a kind of fiduciary inheritance, called also *fidei commissio*, in regard the immediate inheritor has only the use or produce of the thing ; the body thereof being substituted and appropriated to certain persons, who are likewise to have the usufruct in their turns, but are never to have the property.

SUBSTITUTION, in algebra, &c. is the putting, in the room of any quantity in an equation, some other quantity, which is equal to it, but expressed in another manner.

SUBTRACTION, or **SUBTRACTION** in arithmetic, the second rule, or rather operation, in arithmetic, whereby we deduct a less number from a greater, to learn their precise difference.

Prob. I. To subtract integers of like names, when the minuend, or number to be subtracted from, is a greater than or equal to, the subducend, or that which is subtracted.

Rule 1. Place the subducend under the minuend, and draw a line under both. 2. Begin at the right hand ; take the less from the greater, or equals from equals, and set the difference of each row underneath.

Example in integers alone.

Minuend	638
Subducend	<u>213</u>
Remainder	425

The manner of operation.

3 } from { 8 } and there { 5 } which
1 } from { 3 } remain { 2 } below.
2 } from { 6 } remain { 4 }

That is, $\begin{array}{r} 3 \\ 10 \\ 200 \end{array}$ from $\begin{array}{r} 8 \\ 0 \\ 60 \end{array}$ remainder is $\begin{array}{r} 5 \\ 2 \\ 40 \end{array}$
Therefore 213 } $\begin{array}{r} 8 \\ 0 \\ 638 \end{array}$ remainder is $\begin{array}{r} 5 \\ 2 \\ 425 \end{array}$

For since the whole is equal to the sum of all its parts, therefore the subtraction of all its parts is the same with the subtraction of the whole.

Examples in integers and parts.

Minuend	27° 48' 36"
Subducend	<u>12 31 24</u>
Remainder	15 17 12

Minuend	146l. 18s. 6d.
Subducend	<u>22 8 2</u>
	124 10 4

Prob. II. To subtract integers of the same name or denomination, when some of the minuend numbers are less than their inferior in the subducend.

Rule 1. Place your numbers, and begin as before. 2. According to their respective value, take one of the next denomination, out of which subtract, add to the remainder add the minuend, setting their sum underneath. 3. Then as what you took, to the next place, on the left hand, and so proceed by this, or the former rule.

Example

In any equation, if the value of the sub-tangent

tangent comes out positive, it is a sign that the points of intersection of the tangent and axis fall on that side of the ordinate where the vertex of the curve lies, as in the parabola and paraboloids: but if it comes out negative, the point of intersection will fall on the contrary side of the ordinate, in respect of the vertex, or beginning of the abscissa; as in the hyperbola and hyperboliform figures. And universally, in all paraboliform and hyperboliform figures, the subtangent is equal to the exponent of the power of the ordinate, multiplied into the abscissa. If CB (*ibid.* n° 2.) be an ordinate to AB , in any given angle, terminating in any curve AC , and $AB = x$, $BC = y$, and the relation between x and y , that is, the nature of the curve, be expressed by this equation, $x^3 - 2xxy + bxx - bbbx + byy - y^3 = 0$; then this will be the rule of drawing a tangent to it: multiply the terms of the equation by an arithmetical progression; suppose, according to the dimensions of y ,

$$\begin{array}{ccccccc} x^3 & - & 2xxy & + & bxx & - & bbbx & + & byy & - & y^3 & = & 0 \\ 0 & 1 & 0 & 0 & 2 & 3 & & & & & & & \end{array}$$

also according to the dimensions of x , as, $x^3 - 2xxy + bxx - bbbx + byy - y^3$;

$$\begin{array}{ccccccc} 3 & 2 & 2 & 1 & 0 & 0 & \\ & & & & & & \end{array}$$

the former product shall be the numerator, and the latter, divided by x , the denominator of a fraction expressing the length of the subtangent BD , which, in this case, will be

$$\frac{-2xxy + byy - y^3}{3xx - 4xy + 2bx - bb.}$$

SUBTENSE, in geometry, the same with the chord of an arch. See **CHORD**.

Hence, the subtense of an angle is a right line supposed to be drawn between the two extremities of the arch that measures that angle.

SUBTERRANEAN, or **SUBTERRANEAN**, appellations given to whatever is under-ground: thus, naturalists speak of subterraneous fires, damps, &c. See the articles **VULCANO**, **DAMP**, &c.

Subterraneous bodies are more usually called fossils and minerals. See the articles **FOSSILS** and **MINERALS**.

SUBTILE, in physics, an appellation given to whatever is extremely small, fine, and delicate; such as the animal spirits, the effluvia of odorous bodies, &c. are supposed to be. See the articles **ANIMAL SPIRITS**, **EFFLUVIA**, &c.

Materia SUBTILIS, among the cartesianists. See the article **MATERIA SUBTILIS**.

SUBTRIPLE RATIO, is when one number, or quantity, is contained in another three times: thus, 2 is said to be subtriple of 6, as 6 is triple of 2.

SUBULARIA, in botany, a genus of the tetradynamia-filiculosa class of plants with a tetrapetalous, cruciform flower: its fruit is a small bilocular pod, of an obversely cordated figure, containing few, very small and roundish seeds.

SUBULATED, something in the shape of an awl: thus, a subulated leaf is one of an oblong and narrow figure, broadest at the base, and thence gradually decreasing, till it terminates in a point.

SUCCEDANEUM, in pharmacy, denotes a drug substituted in the place of another, in medical composition. See the articles **MEDICINE** and **SUBSTITUTE**.

SUCCENTURIATI RENES, in anatomy, the same with the capsule atrabiliaria. See **CAPSULÆ ATRABILIARIÆ**.

SUCCESSION, *successio*, in philosophy, an idea which we get by reflecting on that train of ideas constantly following one another in our minds, when awake. See the article **IDEA**.

SUCCESSION, in law, implies a right to the whole effects left by a defunct.

SUCCESSOR, in law, one that succeeds, or comes in the place of, another.

It is held, that a sole corporation may take an estate in fee to them and their successors, but not without the word *successors*: whereas an aggregate corporation may take a fee in succession, without expressing the word *successors*; and likewise may have goods and chattels in succession. See **CORPORATION**.

SUCCINUM, **AMBER**, in natural history. See the article **AMBER**.

SUCCISA, in botany and pharmacy, a species of scabiosa, called by some *morsus diaboli*, devil's bit; and said to be alexipharmic, but is little used in the present practice.

SUCCORY, *cichorium*, in botany, &c. See the article **CICHORIUM**.

SUCCOTRINE ALOES. See **ALOES**.

SUCCUBUS, a term used by some imaginary writers, for a daemon who assumes the shape of a woman, and as such lies with a man; in which sense it stands opposed to incubus, which was a daemon in form of a man, that they supposed to lie with a woman.

But the truth is, the succubus is only a species of the incubus, or night-mare. See the article **INCUBUS**.

SUCCULA, in mechanics, a bare axis, or cylind-

cylinder, with staves to move it round ; but without any tympanum or peritrochium.

SUCCULENT PLANTS, those whose leaves are thick, and abound with juice. See the article **PLANT**.

SUCCUS, JUICE, in pharmacy. See the article **JUICE**.

SUCHUEN, a province of China, bounded by that of Xensi on the north, by Honam and Huquam on the east, by Quecheu and Yunam on the south, and by the mountains of India on the west : its chief town is Chingtu.

SUCK-FISH, *remora*, in ichthyology. See the article **REMORA**.

SUCKERS, in gardening, the same with off-sets. See the article **OFF-SETS**.

SUCKING-PUMP. See **PUMP**.

SUCTION, *suctio*, the act of sucking or drawing up a fluid, as air, water, milk, or the like, by means of the mouth and lungs.

There are many effects vulgarly attributed to suction, which, in reality, have very different causes. As when any one sucks water, or any other liquor, up through a pipe, it is commonly thought, that by that action the person draws the air up into his mouth, and that the water, which is contiguous to it, follows it by a kind of attraction, as if the air and water hung together ; and others fancy, that the air moves into the mouth of the sucker, and the water moves up after the air, to prevent a vacuum, which, they say, nature abhors : whereas the true cause of this phenomenon is only, that the air and atmosphere presses, with its whole weight, uniformly on the surface of the liquor in the vessel ; and, consequently, prevents any one part of the water to rise higher than the other there : and if a pipe be put in, of any tolerable large bore, and be open at both ends, the water will rise within the pipe to the same height as without, and, indeed, a little higher, because the pressure of the air within the pipe is a little taken off by bearing against the sides of the pipe. Now when any one applies his mouth to the upper end of the pipe, and sucks, his lips so strongly inclose the pipe, that no air can get between them and it ; and, by the voluntary motion of the spirits in the muscles, the cavity of his thorax, or breast, is opened and enlarged ; by which means the air, included there, hath now a much larger space to dilate itself in, and, consequently, can-

not press so strongly against the upper end of the pipe, as it did before the cavity of the thorax was so enlarged, and when the weight of the whole atmosphere kept its spring bent. And that weight or pressure being now taken off by the lips of the man that sucks, the equilibrium is destroyed, the air gravitates on the surface of the water, but cannot do so on the upper orifice of the pipe, because the juncture of the lips takes it off ; and the spring of the air included in the thorax, being weakened by the dilatation of its cavity, it cannot press so hard against the upper orifice of the pipe, as the water will do against the lower, and, consequently, the water must be forced up into the pipe. It is much the same thing in the suction of a common pump : the sucker being tight, takes off entirely the pressure of the atmosphere on the surface of the water within the barrel of the pump ; and, consequently, the atmosphere, by its weight, must force the water up to make the equilibrium.

SUCULA, or **SUCCULA**. See **SUCCULA**.

SUDAMINA, little heat pimples in the skin, like the millet-grains, frequent in youth, especially those of a hot temperament, and that use much exercise.

SUDATORY, *sudatorium*, a name given by the antient Romans to their hot or sweating-rooms ; sometimes also called *laconica*. See the article **BATH**.

SUDBURY, a borough-town of Suffolk, thirteen miles south of Bury.

It sends two members to parliament.

SUDER-KOPING, a town of Sweden, in the province of Gothland, ninety miles south-west of Stockholm.

SUDOR, SWEAT, in physiology. See the article **SWEAT**.

SUDOR ANGLICANUS, the **SWEATING-SICKNESS**, a disease so called from its appearing first in England, in the year 1483.

It seized different patients in different manners ; for in some it first appeared with a pain in the neck, scapula, legs, or arms ; whilst others perceived only a kind of warm vapour, or flatulence, running through those parts. And these symptoms were suddenly succeeded by a profuse sweat, which the patient could not account for. The internal parts became first warm, and were soon after seized with an incredible heat, which thence diffused itself to the extremities of the body. An intolerable thirst, restlessness, and indisposition of the heart,

liver,





this affords, by fermentation, a very clean and good spirit. See MELASSES.

This coarse sugar is afterwards refined to various degrees of purity by new solutions, and is sold at different prices, and under different names, according to the degree of purity it is brought to. Our sugar refiners first dissolve it in water, then clarify the solution by boiling with whites of eggs and despumation; and after due evaporation pour it into moulds; where the fluid part being drained off, and the sugar concreted, its surface is covered with moist clay, as before. The sugar thus once refined, by repetition of the process, becomes the double refined sugar of the shops. The candy-sugar, or that in crystals, is prepared by boiling down solutions of sugar to a certain pitch, and then removing them into a hot room, with sticks placed across the vessel for the sugar to shoot upon: and these crystals prove of a white or brown colour, according as the sugar used in the process was pure or impure.

A pound of sugar purified to the highest degree, and distilled in a retort, yields first about half an ounce of a limpid, insipid phlegm, without smell; and after this comes over a liquor, at first limpid and colourless, afterwards reddish, and, finally, of an empyreumatic smell, in quantity not less than six ounces; this is partly of an acid, partly of an alkaline and urinous taste; after this comes over a thick and reddish oil, in quantity about three drachms; and then more than an ounce of a brown oil of a thicker consistence. The remainder in the retort, calcined and lixiviated, yields a drachm of a pure alkaline salt.

Sugar is a true salt, and when perfectly pure, after solution, it concretes into regular crystals; these are of a prismatic figure, and consist of eight plain surfaces, in two of which the opposite bases are equal and parallel, the rest are parallelograms. In its natural state, it manifests not the least token of any thing, either acid or alkaline. It is inflammable, in a great degree, burning with a very brisk white flame. It dissolves, with the utmost readiness, in all aqueous menstrua, but very difficultly in spirituous or oily liquors: mixed with water, it, after a time, ferments, and acquires a vinous flavour; and at this time an inflammable spirit, like that of wine, may be drawn from it in a considerable quantity. Many other plants and trees might be

found which would yield sugar; thus several species of maples afford a juice which boils into good sugar. But the great quantity of it yielded by the sugar cane, and its easy culture, renders it unnecessary to look farther after what it so abundantly supplies us with.

The uses of sugar, as a sweetner, are sufficiently known: it promotes the union of distilled oils with watery liquors, and prevents the separation of the butyraceous parts from milk; and hence it is supposed to unite the unctuous part of the food with the animal juices. Sugar is not only innocent, but reconciles to the palate and stomach substances of themselves disgusting to both; and the impure sorts, in consequence of their containing an unctuous or oily matter, prove emollient and laxative. The crystals are the most difficult of solution; and consequently are most proper, where this lubricating sweet is wanted to dissolve slowly in the mouth.

The medicinal preparations of sugar are,

1. Sugar of roses, *saccharum rosaceum*, thus made: take of red rose buds, freed from the heels, and hastily dried, one ounce; and of double refined sugar, one pound: reduce them separately into powder, then mix and moisten them with water, that they may be formed into troches, which are to be dried with a gentle heat.

2. Red sugar of roses, *saccharum rosatum rubrum*, is made thus: take of white sugar, one pound; juice of red-roses, four ounces; and red-roses dried, one ounce: boil the sugar and juice over a gentle fire, till the juice is almost all evaporated; then throw in the dry roses reduced to a very fine powder. Pour out the matter upon a marble, and form it into lozenges according to art.

These preparations are chiefly valued for their agreeableness to the eye and palate; some likewise esteem them, medicinally, as light restringents; and look upon them, not undeservedly, as an excellent addition to milk, in phthical and hectic cases. Some have been accustomed to add a portion of acid, which improves their colour, but at the same time renders them less proper to be used with milk.

3. Barley-sugar, *saccharum hordeatum seu penidiatum*, is made by boiling white sugar in barley-water, *i. e.* a decoction of barley, till it acquires such a consistence, as that it may be drawn out, and

twisted

twisted into threads or strings: this is rarely prepared by the apothecaries, or considered as a medicine.

SUGAR of lead, *saccharum saturni*. See the article **SACCHARUM**.

SUGILLATION, in medicine, an extravasation of blood in the coats of the eye, which at first appears of a reddish colour, and afterwards livid or black. If the disorder is great, bleeding and purging are proper, as are discutients. The following cataplasm is said to be very good: Take of comfrey-root, six ounces; of solomon's seal, two ounces; of elder-flowers, one ounce and a half; of bean-flour, one ounce; let all these be boiled in a sufficient quantity of spring-water. The decoction may be used as a foment, and the ingredients for a cataplasm.

SUIT, in law, is used in different senses, as, 1. For an action, whether personal or real. 2. Suit of court, or suit-service, which is an attendance the tenant owes to his lord's court. 3. Suit-covenant, where a person has covenanted to do service in the court of the lord. 4. Suit-custom, which is where one and his ancestors have owed suit time out of mind. 5. It is used for a petition to the king, or any person of dignity; where a lord distrains his tenant for suit, and none is due; in this case, the party may have an attachment against him to appear in the king's court. 6. Suit of the king's peace, is an action brought against a person for breach of the king's peace; as in the case of treasons, felonies, or trespasses. See **ACTION**, **COURT**, &c.

SUIT-SILVER, a small sum paid in some manors, to excuse the appearance of freeholders at their lord's courts. See the article **COURT**.

SULDY, a town of France, situated on the river Loire, twenty miles south-east of Orleans.

SULMONA, or **SOLMONA**, a town of the hither Abruzzo, in the kingdom of Naples: east long. 15° , north lat. $42^{\circ} 6'$.

SULPHUR, in natural history, a genus of fossils, defined to be dry, solid, but friable fossil bodies; melting with a small heat, when fired in the open air; burning almost wholly away with a blue flame, and noxious vapour; and indued with an electric power, and not dissoluble in acids.

Some have used the word sulphur as a name for the whole series of inflammable bodies, but as we have also been used to distinguish those of a particular kind by

the same name, it seems much more eligible to restrain that name to those bodies, and to give some other for the more general classes.

The word sulphur, in this acceptation, becomes the name of a regular genus of fossils, of which there are four known species. 1. The yellow native sulphur, which in its purest state is of a pale straw colour, and as pellucid as the finest amber; but is more frequently found coarser, and more opaque. It is found in the gold mines of Peru, in Hungary, and in some other places. 2. The green native sulphur. This is harder than the other, and is usually found in small masses composed of several crusts. It is found, so far as is yet known, only about mount Vesuvius. 3. The grey native sulphur, which is common in Iceland, and many other places, and is the coarsest and worst of all the kinds. And, 4. the most rare and beautiful of all the kinds, the red native sulphur. This is of a fine glowing red, like cinnabar, and very bright and transparent, and is found, so far as is yet known, only in the gold mines of Peru.

But besides these native kinds of sulphur, there is a facitious sort, by far the most common in the shops, separated from extraneous matters by means of fire. It is sometimes met with in very large masses, and called sulphur in the cake; but what we most frequently see of it is in oblong cylindric rolls of a yellow colour, sometimes with, and sometimes without, an admixture of greenish. The yellow contains less, the greenish more, of the vitriolic salt mixed with it; it is friable, and affords a sort of crackling noise, when rubbed between the fingers; it is very easily reduced to powder, and melts with a small degree of heat. It may be totally sublimed, in a close vessel, without alteration. It takes fire on being brought into contact with a burning coal, or any ignited matter; and when pure and genuine, for we are liable to great cheats in regard to it, it does not burn away very quickly, but continues a considerable time, emitting a deep blue flame. It is to be chosen for internal use of the purest and brightest yellow, light, easily broken, and appearing very bright and glossy where it breaks. If it be for making oil of sulphur, the greenish rolls are the best, as containing most acid.

This kind of sulphur is separated, by means

means of fire, from various minerals, which are found naturally to contain it. The greatest part of what we have, is made from the common vitriolic pyrites, the same mineral yielding both sulphur and vitriol, and often alum. They first give it a degree of fire sufficient to melt the sulphur it contains, and, when this is all run out into vessels prepared to receive it, they expose the remaining matter to the air, after which they boil it in water, and obtain from the lixivium the common green vitriol or copperas; and after all this is obtained, by adding an alkali to the same liquor, they get alum from it. See VITRIOL and ALUM.

Sulphur, under whichever of these forms it appears, is still the same in all its characters; it dissolves in oils, and alkaline substances; it grows red when melted but turns yellow again when it cools; it affords an acid, the same with that of vitriol, if its fumes in burning be caught in a proper manner; but it will not yield this acid by the common way of distillation.

Sulphur, melted with gold, provided that metal be pure, makes no sort of alteration in it; but this is the only metal that escapes its effects. Thrown upon silver heated red hot, the metal immediately melts, and, if taken from the fire as soon as it does so, it will be found, when cold, to resemble lead rather than what it really is. It retains its malleability perfectly, and cuts easily with a knife; but it is of a dull bluish colour. It is, however, easily reduced again to its proper appearance; for there requires no more to this, than the keeping it a few minutes in a strong fire to burn away the sulphur. If the heat is slackened towards the end of this fusion, the silver will not fall into one uniform mass, but will rise up in small springs all over the surface in a very beautiful manner, resembling the branches of silver, sometimes seen on the surface of ores. Tin melted with brimstone, if the metal be first granulated, and the brimstone added in powder in three times its quantity, deflagrates as if nitre had been mixed with it. The remainder becomes solid, while yet in the fire, and, when cold, is a brittle regulus of the colour of lead, and greatly resembling a semi-metal in its qualities. Tin may indeed be wholly turned into scoria by burning it with additional parcels of sulphur. Sulphur melted along with lead destroys its malleability, as much

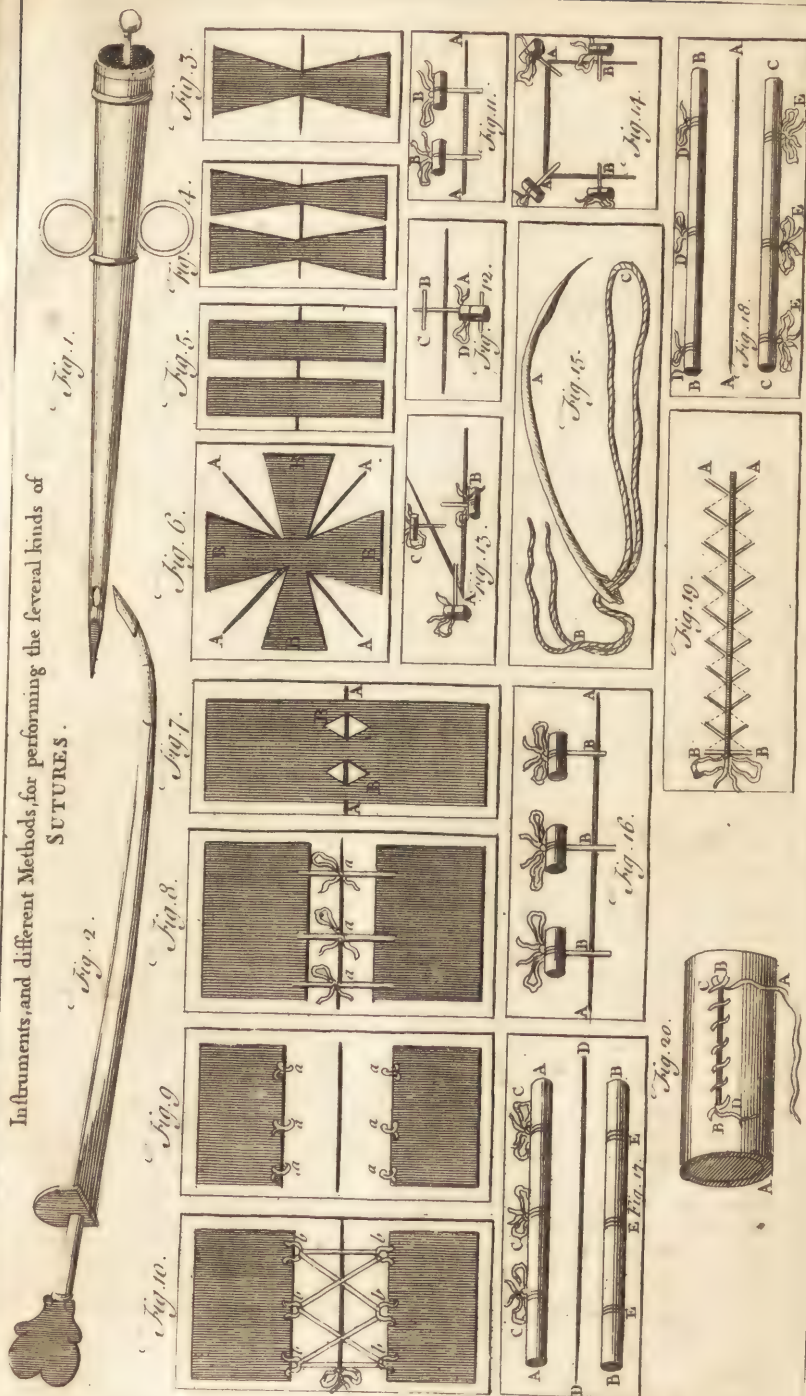
as it does that of tin. It becomes hard and rigid, and very difficult of fusion, and loses the appearance of lead; being, in the regulus thus obtained, composed of broad, bright, and glittering particles. Copper melts immediately upon being made red-hot, if brimstone be added to it; and becomes a black friable substance. Iron of all other metals melts the most freely and readily with the sulphur, but it does not freely part with it again. A red-hot iron applied to a roll of sulphur immediately throws off particles dissolved by the sulphur into a spongy scoria. Regulus of antimony melted with sulphur returns to common crude antimony again. Bismuth melted with it assumes the appearance of antimony, and instead of broad flakes is found to be composed of needles or striæ running across one another. Zink suffers less change from it, and mixes indeed less easily with it; it at length becomes darker coloured, and more brittle.

Uses and preparations of SULPHUR. Besides the great use of sulphur in medicine, chemistry, metallurgy, and the making of gun-powder, it is of great service for whitening silks, and woollen stuffs; for which purpose, its vapour is contrived to be received by them: its vapour also whitens red roses; and even young rooks, taken out of their nests, and exposed thereto, become perfectly white: it has also the same effect upon gold, which may be restored to its colour, by boiling it in water with tartar: and, lastly, its fumes check and prevent fermentation; on which account, it is much used by wine-coopers.

As to the medicinal virtues of sulphur, it is given, in its crude state with great success in diseases of the lungs. It strengthens and cleanses them, and promotes expectoration, and has at all times been famous for its virtues against cutaneous diseases. It generally proves a little loosening to the bowels, and increases the discharges by perspiration; it even communicates its smell to the perspired matter for a considerable time after taking it, and will often blacken gold or silver that is worn by people who take any considerable quantity of it.

The preparations of sulphur, in most frequent use in the shops, are, 1. Flowers of sulphur, *flores sulphuris*, a good pectoral medicine. See the article FLOS. 2. Precipitated sulphur, commonly called milk of sulphur, made by boiling flowers

Instruments, and different Methods, for performing the several kinds of SUTURES.





of sulphur, with thrice their weight of quick lime, till the sulphur is dissolved; and then filtering the solution through paper, let a precipitation be made with weak spirit of vitriol; and lastly, by washing the precipitated powder found at the bottom of the vessel, till it becomes quite insipid. This is good in all uses, where-

in sulphur in substance, or its flowers, are used; its dose being from ten grains to two scruples. 3. Balsam of sulphur is made by boiling flowers of sulphur in four times their weight of oil of olive, in a pot lightly covered, till the oil and sulphur are united into the consistence of a balsam: and in the same manner may a balsam of sulphur be prepared with barbadoes-tar. This, though highly extolled as a pectoral by some authors, ought to be given with great caution; since its acrimony must render it injurious to weak lungs. 4. Spirit or oil of sulphur is an acid, obtained by retaining in any manner the vapours of burning sulphur; it is wholly the same with that of vitriol; being an agreeable acid, and good in every case in which the spirit of vitriol is so. 5. Sulphurated water,

aqua sulphurata, is made thus: take common water one quart, of pure sulphur half a pound, set a part of the sulphur on fire in an iron ladle, and suspend it in that state over the water in a close vessel; let the remainder of the sulphur be afterwards fired and suspended in the same manner, and when the operation is over, the water will have acquired a sharp acid taste, and is to be reserved for use. The most commodious vessel for making this is a large glass receiver fitted with a wooden plug into which the handle of the ladle may be fixed; as soon as the sulphur is fired, the ladle is to be thrust so far into the receiver, that the plug may come to stop the aperture, and the covering the mouth over this with a wet cloth will be sufficient to keep in the fumes.

This is the liquor called by some authors *gas sulphuris*; it is an agreeable acid, and is good in malignant and pectorial fevers, given in the common drink. It quenches thirst, and cools the mouth and tongue.

SULPHUR WORT, in botany, a name by which some call *peucedanum*. See the article **PEUCEDANUM**.

SULTAN, or **SOLDAN**, a title of honour, given to the emperor of the Turks. The

wife of a sultan is called *sultana*, and the favourite one *haseki-sultana*, i. e. the private sultana.

SULTZBACH, or **SULTSBACH**, a city of Bavaria, thirty-two miles north of Ratibon, subject to the duke of Neuburg.

SUM, **SUMMA**, in mathematics, signifies the quantity that arises from the addition of two or more magnitudes, numbers, or quantities together. See **ADDITION**. The sum of an equation is, when the absolute number being brought over to the other side of the equation, with a contrary sign, the whole becomes equal to 0: thus, the sum of the equation $x^3 - 12x^2 + 41x = 42$, is $x^3 - 12x^2 + 41x - 42 = 0$. See **EQUATION**.

SUMACH, *rhus*, and *colinus*, in botany. See the article **COTINUS**.

The seeds, or berries, of the common sumach, are moderately astringent; and have formerly been prescribed in this intention, but are now unknown in the shops. Their chief use, at present, is in the preparation of morocco, and other leather. See **MOROCCO** and **LEATHER**.

SUMATRA, an island in the East-indian ocean, situated between 93° and 104° east long. and between $5^\circ 30'$ north lat. and $5^\circ 30'$ south lat. extending from north-west to south-east, nine hundred miles long, and from one hundred to one hundred and fifty broad.

SUMEREIN, a town of lower Hungary, fifteen miles south of Presburg, subject to the house of Austria.

SUMMARY, in matters of literature, the same with abridgment. See the article **ABRIDGMENT**.

Summary, however, is often used for a table of contents, placed at the beginning of books, to shew the principal heads treated of therein. See **BOOK**.

SUMMATORIUS CALCULUS, in mathematics. See the article **CALCULUS**.

SUMMER, one of the seasons of the year, commencing in these northern regions on the day the sun enters Cancer, and ending when he quits Virgo. Or, more strictly and universally, the summer begins on the day when the sun's meridian distance from the zenith is the least; and ends on the day, when his distance is a mean betwixt the greatest and smallest. The end of summer coincides with the beginning of winter. See **SEASONS**.

SUMMER, in architecture, is a large stone, the first that is laid over columns and pilasters, in beginning to make a cross vault;

vault; or it is the stone which, being laid laid over a piedroit or column, is hollowed to receive the first haunce of a platband.

SUMMER, in carpentry, is a large piece of timber which being supported on two stone piers or posts, serves as a lintel to a door, window, &c.

SUMMIT, the top or vertex of any body, or figure; as of a triangle, cone, pyramid, &c. See **TRIANGLE**, **CONE**, &c.

SUMMITS of flowers, the same with the antheræ, or apices. See **ANTHERÆ**.

SUMMONS, in law, a citing or calling a person to any court, to answer a complaint, or even to give in his evidence.

There must always be a summons in real actions, whereby the sheriff warns the party to appear at a day on the tenants land; also fourteen days before the return, proclamation is to be made thereof, in order that the grand cape may issue.

SUMPTUARY LAWS, *leges sumptuariae*, are laws made to restrain excess in apparel, costly furniture, eating, &c.

SUN, *sol*, ☉ in astronomy, the great luminary which enlightens the world, and by its presence, constitutes day. See the articles **DAY** and **DIURNAL**.

The sun is the principal source of heat upon the earth's surface, and the confines of the earth and atmosphere: without this, says Dr. Shaw, all the bodies upon our globe would doubtless grow fixed, rigid and lifeless; it being the solar heat that stirs within them, as the main spring of their actions; causing all the operations in the animal, vegetable, and mineral kingdoms; and hence also, the ocean and atmosphere continue in a fluid state. See **FIRE** and **HEAT**.

Sir Isaac Newton, in his optics, gives good reasons to suppose the sun and fixed stars to be great earths vehemently hot; whose heat is conserved by the greatness of their bodies, and the mutual action and re-action between them and the light which they emit; and whose parts are kept from fuming away, not only by their fixity, but also by the vast weight and density of the atmospheres incumbent on them, and every way strongly compressing them, and condensing the vapours and exhalations which arise from them. The light seems to be emitted from the sun and fixed stars (which probably are suns to other systems) much after the

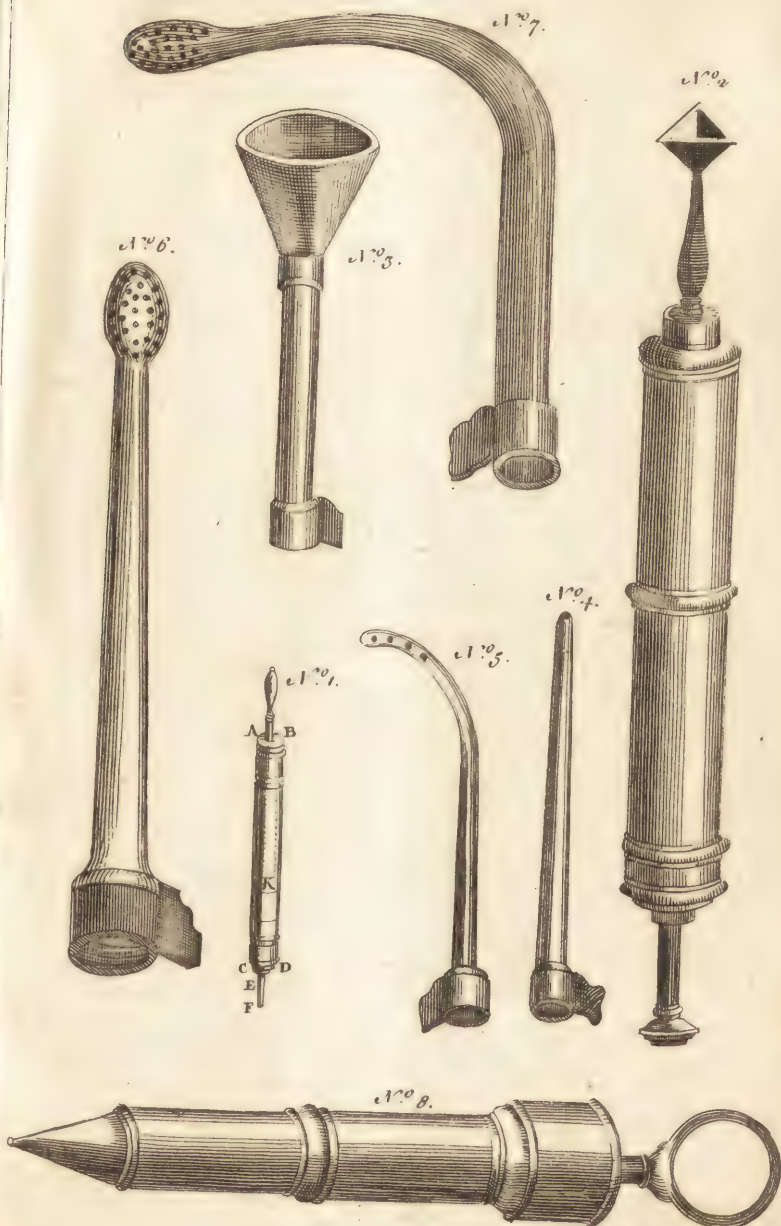
manner as iron, when heated to such a degree as to be just going into fusion, by the vibrating motion of its parts, emits, with force and violence, copious streams of liquid fire all around. Great bodies must preserve their heat longest, and that, perhaps, in the proportion of their diameters. See the article **STAR**.

The sun, then, may be conceived to be a huge body of fire, whence all the planets receive their light; and by the emanation of whose rays and beams of light, the whole system of beings about us is illuminated and rendered visible. In order to compute the diameter, and bulk, or solid content, of the sun, its distance from the earth must be first known by means of the horizontal parallax; to find which, astronomers have attempted a variety of methods, but have as yet found none that will determine it exactly: however, by many repeated observations of Dr. Halley, it is found to be not greater than 12", nor less than 9". Wherefore $10\frac{1}{2}"$ (the mean) has been fixed upon as near the truth, but upon June the 6th 1761, during a transit of Venus over the sun's disk, astronomers had an opportunity of determining the sun's horizontal parallax with great exactness, nay to within a five-hundredth part of the whole, according to a method pointed out by Dr. Halley; and in consequence of observations made during that transit, the sun's parallax has been determined at 8", 69. See **Phil. Trans.** vol. LII. part II. p. 611. & seq. and **Phil. Trans.** n° 348, abridged by Jones, vol. IV. See **PARALLAX**. Supposing, then, the sun's horizontal parallax to be 10", its distance will be found to be 82136014 british miles: and having a double convex lens, as L, (plate CCLXII. fig. 8.) whose focus of parallel rays is at CD, 12 feet, or 144 inches, distant from itself: let this lens be fixed in the window shutter of a darkened room, to receive the sun's rays AL, BL, which coming from the extreme parts of the sun's body, and intersecting each other in the center of the lens, will determine the diameter of the sun's image at CD; which, being nicely measured, will be found $1\frac{34}{100}$ of an inch, the half of which is $Ce = \frac{67}{100}$ of an inch. Then say,

As the focal distance	CL =	144 =	2.158362
To $\frac{1}{2}$ the diameter of the image	Ce =	0.67 =	0.173925
So is the radius	R =	90° 00' =	10.000000
To the sine of the angle	CLe =	00° 16' =	7.667713

There-

SYRINGES.





Therefore, the whole angle CLD (= ALB) = $32'$, which is the sun's apparent diameter, or that under which its diameter appears to the eye.

As the distance of the image

To its diameter

So is the distance of the sun LA = 82136014 = 7.914533

To the sun's diameter, AB = 764320 = 5.883276

Hence the diameter of the sun is found to be $764,320$ english miles; though by other computations, its diameter is found to be only $763,460$ miles, and its distance from our earth $81,000,000$ of miles. See the articles DISTANCE and DIAMETER, under the last of which articles its least mean and greatest apparent diameters may be seen, both according to de la Hire and Hevelius.

The quantity of matter in the sun, compared with that of the earth, has already been taken notice of under EARTH.

From what has there been said, it follows, that the common center of gravity, of the sun and jupiter, is nearly in the superficies of the sun; of saturn and the sun a little within it. And by calculation it is found that the common center of gravity of all the planets cannot be more than the length of the solar diameter distant from the center of the sun: this common center of gravity is proved to be at rest; and therefore, though the sun, by reason of the various position of the planets, may be moved every way, yet it cannot recede far from the common center of gravity. And this it is thought ought to be accounted the center of our world. See the articles COPERNICAN, SYSTEM, CENTER, &c.

By means of the solar spots it hath been discovered, that the sun revolves round his own axis, without moving (considerably) out of his place, in about twenty-five days. And that the axis of this motion is inclined to the ecliptic, in an angle of 87 degrees, 30 minutes, nearly. See MACULÆ and FACULÆ.

The sun's apparent diameter, being sensibly shorter in December than in June, as is plain and agreed from observation, the sun must be proportionably nearer to the earth in winter than in summer; in the former of which seasons will be the perihelion, in the latter the aphelion: and this is also confirmed by the earth's moving swifter in December than it doth in June. For since, as Sir Isaac Newton hath demonstrated, the earth always describes equal areas in equal times, whenever it moves swifter, it must needs be

Now since the diameter of any object and its image, are proportional to their distances from the lens, the real diameter may be found by the following analogy:

CL = 144 = 2.158362

CD = 1.34 = 0.127105

nearer to the sun. And for this reason there are about eight days more from the sun's vernal equinox to the autumnal, than from the autumnal to the vernal.

For the apparent annual motion round the earth, see the article EARTH.

If you divide 360 degrees (i. e. the whole ecliptic) by the quantity of the solar year, it will quote 59 minutes 8 seconds, &c. which therefore is the quantity of the sun's diurnal motion. And, if this 59 minutes 8 seconds be divided by 24 , you have the sun's horary motion, which is 2 minutes 28 seconds; and, if you will divide this last by 60 , you will have this motion in a minute, &c. And this way are the tables of the sun's mean motion, which you have in the books of astronomical calculation, constructed.

For eclipses of the sun, cycle of the sun, maculæ and faculæ of the sun, &c. see ECLIPSE, CYCLE, &c.

SUN-FISH, *mola*, in ichthyology. See the article MOLA.

SUN-FLOWER, in botany. See the articles HELIANTHUS and HELIANTHEMUM.

Dwarf SUN-FLOWER, *rudbeckia*, in botany. See RUDBECKIA.

SUN-DEW; *ros solis*. See ROS.

SUNDA-ISLANDS, those situated near the straits of Sunda, in the indian ocean; the chief of which are Borneo, Java, Sumatra, &c. See BORNEO, &c.

SUNDAY, or the LORD'S-DAY, a solemn festival observed by Christians on the first day of every week, in memory of our Saviour's resurrection.

This is the principal and most noted of the christian festivals, and was observed with great veneration in the ancient church, from the time of the apostles, who themselves are often said to have met on that day for divine service. It is likewise called the sabbath-day, as being substituted in the room of the jewish sabbath. See the article SABBATH.

The antients retained the name Sunday, or *dies solis*, in compliance with the ordinary forms of speech, the first day of the week being so called by the Romans, because it was dedicated to the worship of the sun.

Besides that the most solemn parts of the christian worship were always performed on sundays, this day was distinguished by a peculiar reverence and respect expressed towards it in the observation of some special laws and customs. Among these, we may reckon in the first place, those imperial laws which suspended all proceedings at law upon this day, excepting only such as were of absolute necessity, or eminent charity; such as the manumission of slaves, and the like. Neither was it only the business of the law, but all secular and servile employments were superseded upon this day, still excepting acts of necessity and mercy. Another thing which the christian laws took care of, to secure the honour and dignity of the lord's-day, was, that no ludicrous sports or games should be followed on this day; but all such recreations and refreshments as tended to the preservation or conveniency of life were allowed of; and therefore, sunday was always a day of feasting, and it was not allowable to fast thereon, not even in Lent. The great care and concern of the primitive Christians in the religious observation of the lord's-day, appears first from their constant attendance upon all the solemnities of public worship, from which nothing but sickness, imprisonment, banishment, or some great necessity could detain them. Secondly, from their zeal in frequenting religious assemblies on this day, even in times of the hottest persecution, when they were often beset and seized in their meetings and congregations. Thirdly, from their studious observations of their vigils or nocturnal assemblies that preceded the lord's-day. Fourthly, from their eager attendance on sermons, in many places, twice upon this day, and their constant resorting to evening prayers, where there was no sermon. Lastly, from the severe censures inflicted on those who violated the laws concerning the religious observation of this day, such persons being usually punished with excommunication, as appears from the apostolical constitutions, and the canons of several councils. In the romish breviary, and other offices, we meet with a distinction of sundays; into those of the first and second class; Sundays of the first class are, Palm-sunday, Easter-sunday, Advent, Whit-sunday, &c. those of the second class are the common sundays of

the year. See the articles PALM-SUNDAY, EASTER-SUNDAY, &c.

By our laws, no person is to do any wordly labour on this day, which is set apart for the service and worship of God, except works of necessity and charity, under the penalty of five shillings. And if any person cry, or expose to sale any wares, or goods on a Sunday, the same will be forfeited to the poor, &c. the offender being convicted thereof before a justice of the peace, &c. who is authorised to cause the penalties and forfeitures to be levied by distress. Yet this extends not to dressing of meat, nor to the crying or selling of milk in the morning or evening, or the selling of mackrel on that day. The sunday is not a day in law, so that no process lies, or may be served thereon, except for treason or felony, or on an escape. A sale of goods, or contract made on a sunday, is deemed void. For the sunday-letter, or that letter of the alphabet which points out in the calendar the sundays throughout the year, see DOMINICAL LETTER.

SUNDERLAND, a port town of Durham, situated on the German Sea, at the mouth of the river Ware, ten miles north east of Durham city.

SUNDERLAND, or **SUDERMANIA**, a province of Sweden, bounded by the Meller Lake, which divides it from Uplandia, on the north; by the Baltic Sea on the east; and by Gothland on the south and west.

SUNNEBERG, a town of Germany, in the circle of Upper Saxony, and marquisate of Brandenburg, situated fifty miles north-east of Berlin.

SUNTGOW, a territory in the circle of the upper Rhine in Germany, bounded by Alsace on the north; by the river Rhine, which divides it from the Bris-gow, on the east; by Switzerland on the south, and by Franche-Compte on the west.

SUOVETAVRILIA, an ancient roman sacrifice, so called because it consisted of a pig (*sus*), a sheep, or rather ram (*ovis*) and a bull (*taurus*). They were all males, to denote the masculine courage of the roman people. It was likewise called *solitaurilia*, because the animals offered up were always (*solida*) whole or uncut.

SUPERBIPARTIENS. See **RATIO**.

SUPERCARGO, a person employed by merchants to go a voyage, and oversee their

their cargo, or lading, and dispose of it to the best advantage. See the articles CARGO, FACTOR, &c.

SUPERCILIUM, in anatomy, the eyebrow. See the article EYE-BROW.

SUPERCILIUM, in the ancient architecture, the uppermost member of the cornice, called by the moderns corona, crown, or larmier.

It is also used for a square member, under the upper tore in some pedestals; some authors confound it with the tore itself. See the article TORE.

SUPEREROGATION, in theology, what a man does beyond his duty, or more than he was commanded to do. The Romanists stand up strenuously for works of supererogation, and maintain, that the observance of evangelical councils is such. By means hereof, a stock of merit is laid up, which the church has the disposal of, and which she distributes in indulgences to such as need. The reformed church do not allow of any work of supererogation.

SUPERFETATION, *superfœtatio*, in medicine, a second, or after conception, happening, when the mother, already pregnant, conceives of a later coition; so that she bears at once two foetuses of unequal age and bulk, and is delivered of them at different times. We meet with instances of superfetations in Hippocrates, Aristotle, Du Laurens, &c. But they are said to be much more frequent in hares and fows. Naturalists hold, that female rats are frequently born with young rats in their wombs; and we are told of extraordinary instances of this kind in the female part of the human species, by Bartholine, Mentzelius, and in the history of the Royal Academy of Sciences.

SUPERFICIAL CONTENT. See SUPERFICIES, AREA, and MEASURING.

SUPERFICIAL fourneau, in fortification, the same with caisson. See CAISSON.

SUPERFICIES, or SURFACE, in geometry, a magnitude considered as having two dimensions; or extended in length and breadth, but without thickness or depth. In bodies, the superficies is all that presents itself to the eye. A superficies is chiefly considered as the external part of a solid. When we speak of a surface simply, and without any regard to body, we usually call it figure. The several kinds of superficies are as follow. Rectilinear superficies, that comprehend-

ed between right lines; curvilinear superficies, that comprehended between curve lines; plane superficies, is that which has no inequality, but lies evenly between its boundary lines; convex superficies, is the exterior part of a spherical, or spheroidal body; and a concave superficies, is the internal part of an orbicular or spheroidal body.

The measure or quantity of a superficies, or surface, is called the area thereof. See AREA and MEASURE.

The finding of this measure, or area, is called the quadrature thereof. See the article QUADRATURE.

To measure the surfaces of the several kinds of bodies, as spheres, cubes, parallelepipeds, pyramids, prisms, cones, &c. See the article SPHERE, &c.

Line of SUPERFICIES, a line usually found on the sector, and Gunter's scale, the description and use whereof, see under SECTOR and GUNTER'S SCALE.

SUPERFINE, in the manufactories, a term used to express the superlative fineness of a stuff; thus a cloth, a camblet, &c. are said to be superfine, when made of the finest wool, &c. or when they are the finest that can be made. The term is particularly used among gold or silver wire drawers, for the gold or silver wire, which after being drawn through an infinite number of holes, each less and less, is at length brought to be no bigger than an hair.

SUPERINSTITUTION, *superinstitutio*, denotes an institution upon another, as where AB is admitted and instituted to a benefice upon one title, and CD is admitted and instituted on that of another.

SUPERINTENDANT, in the french customs, an officer who has the prime management and direction of the finances or revenues of the king. The term is also used for the first officer of the queen's household, who has the chief administration thereof. They have also a superintendent of the buildings, answering to the surveyor of the works among us. See the article SURVEYOR.

SUPERINTENDANT also denotes an ecclesiastical superior in several reformed churches, where episcopacy is not admitted, particularly among the Lutherans in Germany, and the Calvinists in some other places. The superintendent is in effect little other than a bishop, only his power is somewhat more restrained than that of the diocesan bishops. He

is the chief pastor, and has the direction of all the inferior pastors within his district or diocese.

SUPERIOR, or **SUPERIOUR**, something raised above another, or that has a right to command another.

SUPERJURARE, was antiently a term used in our law where a criminal endeavoured to excuse himself by his own oath, or by the oath of one or two witnesses; and the crime charged against him was so notorious, that he was convicted upon the oaths of many more witnesses; this was termed superjurare.

SUPERLATIVE, in grammar, one of the three degrees of comparison, being that inflection of nouns-adjective that serves to augment and heighten their signification, and shews the quality of the thing denoted to be in the highest degree. See the articles **COMPARATIVE**, **POSITIVE**, and **COMPARISON**.

In english, the superlative is usually formed by the addition of *est* to the positive, as *richest*, *greatest*, &c. and frequently by prefixing of *most*, as *most rich*, *most great*, &c.

SUPERNUMERARY, something over and above a fixed number. In several of the offices are supernumerary clerks, to be ready on extraordinary occasions. There are also supernumerary surveyors of the excise, to be ready to supply vacancies when they fall; these have but half pay. In music, the supernumerary, called by the Greeks *proslambanomenos*, is the lowest of the chords of their system, answering to *a*, *mi*, *la*, of the lowest octave of the moderns. See the article **DIAGRAM**.

SUPERONERATIONE PASTURÆ, in law, a judicial writ which lies against a person that is impleaded in the county-court, for surcharging of a common with his cattle, in a case where he was formerly impleaded for it in the same court, and the cause is removed into one of the courts at Westminster.

SUPERPARTICULAR, } See **RATIO**.
SUPERPARTIENS, }

SUPER-PRÆROGATIVA REGIS, in law, a writ that formerly lay against the king's widow, for marrying without a licence.

SUPER-PURGATION, *hypercatharsis*, in medicine, an excessive over-violent purging, the usual effects of colliquating, corrosive and stimulating medicines. In the beginning of this disorder, a very thin matter is evacuated: but after-

wards, when the relaxation and-aperture of the vessels are increased, the necessary humours are discharged; there is first an excretion of yellow bile, then of phlegm, then of black bile, and last of all blood. See the article **FLUX**.

Those who labour under a superpurgation, must be treated with frictions of the skin, and a warm bath, drinking before they bathe thin, red, or yellow wine, for such is easiest of distribution, with sops of bread, and pomegranates. If the evacuation continues, let the limbs be bound in such a manner, that the bandage may be carried from the upper to the lower parts. Exhibit also a small quantity of theriaca, to be taken with the flesh of vipers, or for want of that, troches of theriaca, or troches of seeds, and of the antidote called philonium. Cupping-glasses may also be applied to the stomach, and cataplasms of polenta and mulsun; after which, you may use astringent epithems, but the greatest relief is had from frictions of the whole body, and potable remedies. The patient should keep himself from cold air, or what is very warm. If the evacuation still continues, the aforesaid cataplasms should be applied, and ob-tundents injected in clysters, such as the fat of goose, sweet wine, oil of spike, and the like.

SUPERQUADRIPARTIENS. See the article **RATIO**.

SUPERSCAPULARIS INFERIOR, in anatomy, the same with *infraspinatus*. See the article **INFRASPINATUS**.

SUPERSCAPULARIS SUPERIOR, is the same with *supraspinatus*. See the article **SUPRASPINATUS**.

SUPERSEDEAS, in law, according to Fitzherbert, is a writ which lies in divers cases, and in general signifies a command to stay some of the ordinary proceedings in law, which, on good cause shewn, ought not to proceed. It is likewise used for staying of an execution after a writ of error is allowed, and bail put in, but not before bail is given, in case there be a judgment upon verdict, or by default in debt, &c. A *supersedeas* is also granted by the court for setting aside an erroneous judicial process, &c. And a prisoner may be thereby discharged upon entering his appearance, and on the plaintiff's not filing a declaration against him. For this writ is as good a cause to discharge the person, as the first process is to arrest him. There is a further writ of *supersedeas*,

sedes, where an *audita querela* is sued, and in cases of surety of the peace, when one is already bound to the peace in chancery, or elsewhere.

SUPER-STATUTO DE ARTICULIS CLERI, in law, a writ that lies against the sheriff, or other officer that distrains in the king's highway, or in the lands antiently given to the church.

SUPER-STATUTO FACTO POUR SENE-SCHAL ET MARSHAL DE ROY, &c. a writ which lies against the steward or marshal, for holding plea of freehold in his court, or for trespass, or contracts not made within the king's household.

SUPER-STATUTO VERSUS SERVANTES ET LABORATOIRES, a writ lying against a person who keeps another person's servant departed from his service, contrary to law.

SUPERSTITION, extravagant devotion, or religion, wrong directed, or conducted.

SUPERVISOR, a surveyor, or overseer. See the article *SURVEYOR*, &c.

It was formerly, and still remains a custom among some persons, to appoint a supervisor of a will, to see that the executors thereof do punctually observe and perform the same.

Supervisor formerly was used for surveyor of the highways. There are likewise certain officers of the excise, who are called supervisors, on account of their having the supervising and inspecting of the books, &c. of the inferior officers belonging to that branch of the revenue, to prevent their neglect of duty.

SUPINATION, in anatomy, the action of a supinator-muscle, or the motion whereby it turns the hand so as that the palm is lifted up towards heaven. See the next article.

SUPINATOR, in anatomy, a denomination given to two muscles of the arm, the one called the supinator longus, the other the supinator brevis, both serving to turn the palm of the hand upwards. The first has its origin from the exterior spine of the humerus, and its termination at the lower end of the radius; the second rises from the upper part of the ulna, and is inserted into the upper part of the radius, which it totally surrounds and incloses. This last muscle may also be of use in the bending of the cubit.

SUPINE, in latin grammar, part of the conjugation of a verb, being a verbal substantive of the singular number, and the fourth declension,

There are two kinds of supines; one, called the first supine, ending in *um*, of the accusative case, is always of an active signification, and marks a motion, as *abiti deambulatum*; the other, called the last supine, and ending in *u*, of the ablative case, is of a passive signification, and is governed by substantives or adjectives, as, *facile dictu*, &c.

SUPPLE, to supple a horse in the manege, is to make him bend his neck, shoulders, and sides, and to render all the parts of his body more pliable.

SUPPLEMENT of an arch, in geometry, or trigonometry, is the number of degrees that it wants of being an entire semicircle; as a complement, signifies what an arch wants of being a quadrant. See the article *COMPLEMENT*.

SUPPLEMENT, in matters of literature, an appendage to a book, to supply what is wanting therein.

SUPPLICAVIT, in law, a writ that issues out of the court of chancery for taking surety of the peace, where a person is in danger of receiving some bodily hurt from another. It is directed to the justices of the peace and sheriff of the county, and is grounded on the statute 1. of Edward III. which appoints, that certain persons shall be appointed by the lord-chancellor to take care of the peace. In order to sue out this writ, the party requiring it first goes before one of the masters in chancery and makes oath, that he does not desire the same out of any malice, but purely for his own safety, and the security of his person; upon which the master will make out a warrant, ordering the writ to be made out by one of the clerks of the six clerks office, after which the writ must be delivered to the sheriff to have his warrant thereon for arresting the party, &c.

SUPPORTED, in heraldry, a term applied to the uppermost quarters of a shield when divided into several quarters, these seeming as it were supported or sustained by those below. The chief is said to be supported when it is of two colours, and the upper colour takes up two thirds of it. In this case it is supported by the colour underneath.

SUPPORTERS, in heraldry, figures in an achievement placed by the side of the shield, and seeming to support or hold up the same. Supporters are chiefly figures of beasts: figures of human creatures, for the like purpose, are properly called *tenants*. Some make another difference

ference between tenant and supporter: when the shield is borne by a single animal, it is called tenant; when by two, they are called supporters. The figures of things inanimate sometimes placed aside of escutcheons, but not touching or seeming to bear them, though sometimes called supporters, are more properly cotises. See the articles **TENANT** and **COTICE**.

The supporters of the british arms are a lion and an unicorn: those of the french arms are angels, &c. See **ARMS**.

In England, none under the degree of a banneret are allowed supporters, which are restrained to those called the high nobility. The Germans permit none but princes and noblemen of rank to bear them; but among the French the use of them is more promiscuous.

SUPPOSITION, in music, the using two successive notes of equal value as to time, one of which, being a discord, supposes the other a concord. See **HARMONY**.

The harmony, Mr. Malcolm observes, is to be always full on the accented part of the measure or bar, and void of discords; yet here discords, by proper resolution and preparation, are even necessary on the unaccented part of the measure. Discords, by conjoint degrees, may pass without much offence, and it is not there required that the harmony be so complete as on the accented part. This transient use of discords, followed by concords, makes what the French call supposition. There are several kinds of supposition. The first is when the principal parts proceed gradually from concord to discord, and from discord to concord; the intervening discord serving only as a transition to the following concord. Another kind is when the parts do not proceed gradually from the discord to the concord, but descend to it by the interval of a third. A third kind, like the second, is when the rising to the discord is gradual, but the descending from it to the following concord, is, by the distance of a fourth. A fourth kind, very different from all the rest, is when the discords fall on the accented part of the measure, and the rising to it is by the interval of a fourth: in which case it is absolutely necessary to follow it immediately by a gradual descent into a concord that has just been heard before the harmony to make the preceding discord pass without offence, and only seem a transition to the concord.

SUPPOSITORY, *suppositorium*, in pharmacy, a kind of medicated cone, or ball, which is introduced to the anus for opening the belly. Suppositories are usually made of soap, sugar, alum, or a piece of tallow-candle, about the length of a man's thumb and the breadth of a finger, though they may be made smaller for children, and sometimes a little thicker for adults. Suppositories are sometimes compounded of ingredients adapted to the disease and circumstances of the patient, as of honey, salt, powder of aloes, colocynthia, and the like. If one suppository does not occasion a stool, it must be followed by another stronger one; and if that does not succeed, the repetition must be continued till the effect required is produced. They are sometimes lubricated with oil or butter, that they may be introduced with greater ease. Some use a lozenge of sugar, or a piece of thin linen cloth rolled up with a little lard or salt-butter, which greatly loosens the belly. For ulcers of the rectum, the best suppositories are made of honey of roses, powder of mastich and myrrh, or of colophony. The stronger suppositories, which are composed of acrid and stimulating ingredients, are advantageously used in promoting a difficult birth, if the infant be in a natural position; and also for expelling the secundines when they are tenaciously retained in the uterus. In exhibiting them the patient should be put in the same posture as in giving a clyster, and the suppository must be gently thrust up the anus with the finger.

SUPPRESSION, in law, the extinction or annihilating of an office, right, rent, or the like.

SUPPRESSION, in grammar and rhetoric, denotes an omission of certain words in a sentence, which yet are necessary to full and perfect construction: as, "I come from my father's;" that is, "from my father's house."

Suppression is a figure of speech very frequent in our language, chiefly used for brevity and elegance. Some rules relating thereto are as follow: 1. Whenever a word comes to be repeated in a sentence oftener than once, it is to be suppressed. Thus we say, "This is my master's horse," not "This horse is my master's horse." 2. Words that are necessarily supplied may be suppressed: and 3. All words that use and custom suppress

press in other languages, are also to be suppressed in English, unless there be particular reasons for the contrary.

Suppression is also a figure in speech whereby a person in rage, or other disturbance of mind, speaks not out all he means, but suddenly breaks off his discourse. Thus the gentleman in Terence, extremely incensed against his adversary, accosts him with this abrupt saying, "Thou of all." The excess of his indignation and rage choaked the passage of his voice, and would not suffer him to utter the rest. But in these cases, though the discourse is not complete, the meaning is readily understood, and the evidence of the thought easily supplies the defect of words. Suppression sometimes proceeds from modesty and fear of uttering any word of ill and offensive sound.

SUPPRESSION, in medicine, is generally used for a retention of urine or the menses. See the article **DYSURIA**, **ISCHURIA**, **MENSES**, &c.

SUPPRESSIONIS IGNIS, a fire of suppression, a term used in chymistry to express such an application of fire to any subject that it shall at once act upon it, both above and below, in the same manner. The usual way of giving this heat is by covering the vessel in which the ingredients are put with sand, and then laying hot coals upon that, so that they may heat through the sand downwards.

SUPPURATION, in medicine and surgery, the second way wherein an inflammation terminates, being a conversion of the inspissated blood and the soft adjacent parts, as the vessels and fat into pus, or matter: which disorder, when it has not yet found an opening, is generally called an abscess. See **INFLAMMATION**, **ABSCESS**, **PHLEGMON**, **TUMOUR**, &c.

The best cure of an inflammation is by resolution or dispersion: but when this is out of the power of the surgeon or physician to effect, and when tumours and phlegmons shew a tendency to suppuration, all the resolving and dispersing medicines must be laid aside, and great care must be taken to forward the maturity of the inflammation; that is, to convert the stagnated blood into laudable matter; then to give a discharge or vent to this suppurated matter; afterwards to cleanse the part; and finally to incise and heal it. See the articles **DISPERSION**, **ULCER**, **WOUND**, &c.

In general, suppuration is to be promoted by such of the emollient medicines

as obstruct the pores of the skin, as fats, oils, and glutinous medicines; as also the sharp, pungent, and in some degree caustic medicines, which may be used in form of cataplasms or plasters. But to be more particular, suppurating medicines, besides those already enumerated under abscess, &c. are the fats of a goose, of a dog, of a man, of a viper, and of a bear; pigeon and cow-dung; bran, yeast, herrings, leeches, melilot, tobacco, oil, burgundy pitch, common-pitch, rosin, deer-suet, ox-suet, sheep-suet, and frankincense. These medicines, either alone or compounded, are to be applied hot to the part, and the application frequently repeated, till the matter within is found to be sufficiently ripened by the softness and whiteness of the tumour: but when the abscess is small, it is sufficient and more convenient to apply some of the ripening plasters, as diachylon, with the gums, or the like, till the suppuration is perfected.

A ripening cataplasm from the London dispensatory, is as follows: Take of figs, four ounces; yellow basilicum ointment, one ounce; galbanum strained, half an ounce: beat the figs thoroughly in a mortar, occasionally dropping in some spirit of wine, or strong ale; then carefully mix them with the ointment first liquified along with the galbanum. And a ripening plaster from the Edinburgh dispensatory is this, Take of gum-plaster, an ounce and a half; burgundy-pitch, half an ounce: boil them together.

In general, it is to be observed, that suppurative medicines are such as by the activity and warmth of their parts are able to penetrate the pores, and mix with and rarify any obstructed matter, so that it may be rendered fit to discharge, upon laying open the part by a caustic or incision. Now, in many instances, as the matter by this means rarifies and grows more fluid, the reflux blood is apt to wash it back into the common mass, which sometimes is of that nature as to do a great deal of mischief; or by making it take up more room upon its rarefaction, occasions it more to distend the parts in which it is contained, whereon a sense of pain is excited, and thereby a greater concourse of fluid, and consequently a needless increase of the tumour; so that medicines under this denomination require to be in the hand of such as are so well acquainted with the mechanism of the animal economy as to be able to apply them to the best

advantage.

advantage, and know how to avoid the hazards which may arise from their abuse. Nor are internal remedies to be neglected in order to further a suppuration, especially when the tumours are large and of consequence. In these cases, when the blood moves too slowly, which may be known by the pulse, the patient must be allowed to eat mear, and must take such medicines as are warm and stimulating, by means of which, and by the increased motion of the blood, the inspissated particles contained in the smaller vessels will be the more easily converted into matter. Strong broths are very proper for this purpose, as also the use of wine, or ale, in moderation; and venice-treacle, diascordium, and the confection of alkermes, are to be the medicines taken three or four times a day, and medicated teas made of saunders-wood, sassafras, or cinnamon. But on the contrary, when the motion of the blood is too violent, and the heat too great, cooling medicines are to be given, such as the thin and watery drinks, the sub-acid medicines, and nitre: bleeding in a small quantity is also often necessary in this case. But when the constitution is sound, and the blood's motion regular, the use of internal medicines to promote suppuration is trifling, and may be altogether rejected.

SUPPURATIVES, or **SUPPURATING MEDICINES**, such as promote suppuration. See the preceding article.

SUPPURATION. See **COMPUTATION**.

SUPRACOSTALES, or **LEVATORES COSTARUM**, in anatomy, muscles serving to respiration; being among those that dilate the thorax for that end, and therefore reckoned among the dilatatores. See the article **DILATATORES**.

These muscles are of two kinds, being distinguished from their figures into short and long. The short ones are twelve on each side; they have their origin from the transverse processes of eleven vertebræ of the back, and of one that is in the lower one of the neck, and they are inserted into the hinder part of the ribs. The long supracoſtales are three or four: their origin is the same from the seventh, eighth, ninth, and tenth vertebræ, and their end in the ninth, tenth, eleventh, and twelfth ribs.

SUPRALAPSARY, in theology, a person who holds that God, without any regard to the good or evil works of men, has resolved, by an eternal decree, to

save some and damn others. These are also called antelapsaries, and are opposed to sublapsaries and infralapsaries.

SUPRASPINATUS, in anatomy, a muscle thus called from its fleshy origination at the upper end of the basis of the scapula above the spine, to the upper part whereof it is connected, as also to the superior edge of the scapula, whence marching along the upper interscapulum, or thin part of the scapula, which it fills, it passes under the acromium and articulation of the humerus. It helps to lift the arm upwards.

SUPREMACY, in our polity, the superiority or sovereignty of the king over the church as well as state, whereof he is established head. See the article **KING**. The king's supremacy was at first established, or, as others say, recovered, by king Henry VIII. in 1534, after breaking with the pope. It is since confirmed by several canons, as well as by the articles of the church, and is passed into an oath which is required as a necessary qualification for all offices and employments both in church and state, from persons to be ordained, from the members of both houses of parliament, &c.

SURA, in anatomy, the calf, or fleshy part of the leg. The word is also used by some for the fibula. See **FIBULA**.

SURAT, a city and port-town of hither India, in the province of Guzurat, or Cambaya, situated on the river Tapte, ten miles east of the Indian-sea: in east long. 72° 20', north lat. 21° 30'.

SURBATING, among farriers, is when the sole of a horse's foot is worn, bruised, or spoiled by beating the hoof against the ground in travelling without shoes, or going in hot sandy lands, or with a shoe that hurts the sole, lies too flat to it, or the like. Sometimes also it happens by over-riding a horse while young, before his feet are hardened; and sometimes by the hardness of the ground and high lifting his feet. The signs hereof are his halting on both fore-legs, and going stiffly, and creeping as if half foundered. In the general, there is nothing better for surbated feet than tar melted into the foot, or vinegar boiled with foot to the consistence of a broth, and put into the foot boiling hot, with hords over it, and splints to keep it in.

SURCHARGE, the same with overcharge, and whatever is above that which is just and right. Surcharge of the forest or a common, is when a commoner puts more beasts

beasts in the forest or common than he has a right to do.

SURCINGLE, a girdle wherewith the clergy of the church of England usually tie their cassock. See **GIRDLE**.

SURCOAT, a coat of arms to be worn over the body armour. See the article **COAT of arms**.

The surcoat is properly a loose thin taffaty-coat, with arms embroidered or painted on it, such as is worn by heralds: antiently also used by military men over their armour, to distinguish themselves by.

SURCULUS, in the anatomy of plants, a word used to express that part of the branching of the ribs of a leaf, which is of a middle kind betwixt the great middle rib and the smallest reticular ramifications. The middle rib is by the writers on these subjects called petiolum. The first division that go off laterally from these are called rami, or branches; the next division of these into more minute ones, surculi; and the final divarications of these into the reticular work that spreads itself over the whole leaf, capillamenta. See the article **PETIOLUM**, &c.

SURD, in arithmetic and algebra, denotes any number or quantity that is incommensurable to unity: otherwise called an irrational number or quantity.

The square roots of all numbers, except 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, &c. (which are the squares of the integer numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, &c.) are incommensurables: and after the same manner the cube roots of all numbers but of the cubes of 1, 2, 3, 4, 5, 6, &c. are incommensurables: and quantities that are to one another in the proportion of such numbers, must also have their square-roots, or cube roots, incommensurable.

The roots, therefore, of such numbers, being incommensurable, are expressed by placing the proper radical sign over them: thus $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, $\sqrt{6}$, &c. express numbers incommensurable with unity. However, though these numbers are incommensurable themselves with unity, yet they are commensurable in power with it; because their powers are integers, that is, multiples of unity. They may also be commensurable some-

times with one another, as the $\sqrt{8}$ and $\sqrt{2}$; because they are to one another as 2 to 1: and when they have a common

measure, as $\sqrt{2}$ is the common measure of both; then their ratio is reduced to an expression in the least terms, as that of commensurable quantities, by dividing them by their greatest common measure. This common measure is found as in commensurable quantities, only the root of the common measure is to be made their common divisor: thus

$$\frac{\sqrt{12}}{\sqrt{3}} = \sqrt{4} = 2, \text{ and } \frac{\sqrt{18a}}{\sqrt{2}} = 3\sqrt{a}.$$

A rational quantity may be reduced to the form of any given surd, by raising the quantity to the power that is denominated by the name of the surd, and then setting the radical sign over it: thus

$$a = \sqrt[n]{a^n} = \sqrt[n]{a^3} = \sqrt[n]{a^4} = \sqrt[n]{a^5} = \sqrt[n]{a^n},$$

$$\text{and } 4 = \sqrt[4]{16} = \sqrt[4]{64} = \sqrt[4]{256} = \sqrt[4]{1024} = \sqrt[4]{4^n}.$$

As surds may be considered as powers with fractional exponents, they are reduced to others of the same value that shall have the same radical sign, by reducing these fractional exponents to fractions having the same value and a common denominator. Thus $\sqrt[n]{a} = a^{\frac{1}{n}}$,

$$\text{and } \sqrt[m]{a} = a^{\frac{1}{m}}, \text{ and } \frac{1}{n} = \frac{m}{nm}, \frac{1}{m} = \frac{n}{nm},$$

and therefore $\sqrt[n]{a}$ and $\sqrt[m]{a}$, reduced to

the same radical sign, become $\sqrt[nm]{a^m}$ and $\sqrt[nm]{a^n}$.

If you are to reduce $\sqrt{3}$ and $\sqrt[3]{2}$ to the same denominator, consider $\sqrt{3}$ as equal to $3^{\frac{1}{2}}$, and $\sqrt[3]{2}$ as equal to $2^{\frac{1}{3}}$, whose indices reduced to a common denominator, you have $3^{\frac{1}{2}} = 3^{\frac{3}{6}}$, and $2^{\frac{1}{3}} = 2^{\frac{2}{6}}$, and consequently, $\sqrt{3} = \sqrt[6]{3^3} = \sqrt[6]{27}$, and $\sqrt[3]{2} = \sqrt[6]{2^2} = \sqrt[6]{4}$; so that the proposed surds $\sqrt{3}$ and $\sqrt[3]{2}$, are reduced to other equal surds $\sqrt[6]{27}$ and $\sqrt[6]{4}$, having a common radical sign.

Surds of the same rational quantity are multiplied by adding their exponents, and divided by subtracting them; thus,

$$\sqrt[2]{a} \times \sqrt[3]{a} = a^{\frac{1}{2}} \times a^{\frac{1}{3}} = a^{\frac{3}{6}} \times a^{\frac{2}{6}} = a^{\frac{5}{6}} = \sqrt[6]{a^5}$$

$$\sqrt[6]{a^5}; \text{ and } \frac{\sqrt{a}}{\sqrt[3]{a}} = \frac{a^{\frac{1}{2}}}{a^{\frac{1}{3}}} = a^{\frac{1}{2} - \frac{1}{3}} = a^{\frac{1}{6}} = \sqrt[6]{a}$$

$$\sqrt[m]{\frac{m}{n}} = \sqrt[m]{\frac{m}{n}} = \sqrt[m]{\frac{m}{n}}; \sqrt[m]{a} \times \sqrt[m]{a} = a$$

$$\sqrt[m]{\frac{m+n}{mn}}; \sqrt[n]{\frac{n-m}{mn}} = \sqrt[mn]{\frac{m+n}{n-m}}; \sqrt[2]{2} \times \sqrt[3]{2} =$$

$$\sqrt[6]{2^5} = \sqrt[6]{32}; \sqrt[3]{\frac{2}{3}} = \sqrt[6]{2}.$$

If the furds are of different rational

quantities, as $\sqrt{a^2}$ and $\sqrt{b^3}$, and have the same sign, multiply these rational quantities into one another, or divide them by one another, and set the common radical sign over their product or

quotient. Thus, $\sqrt{a^2} \times \sqrt{b^3} = \sqrt{a^2 b^3}$;

$$\sqrt[2]{2} \times \sqrt[2]{5} = \sqrt[2]{10}; \sqrt[m]{\frac{a^4}{b^3 a}} = \sqrt[m]{\frac{a^4}{b^3 a}} =$$

$$\sqrt[m]{\frac{a^3}{b^3}}; \sqrt[3]{\frac{9}{24}} = \sqrt[3]{\frac{9}{24}} = \sqrt[3]{\frac{3}{8}} = \frac{1}{2}$$

$$\sqrt[2]{3}.$$

If furds have not the same radical sign, reduce them to such as shall have the same radical sign, and proceed as before;

$$\sqrt[m]{a} \times \sqrt[n]{b} = \sqrt[nm]{a^m b^n}; \sqrt[n]{\frac{a}{x^m}} = \sqrt[n]{\frac{a}{x^m}};$$

$$\sqrt[2]{2} \times \sqrt[3]{4} = 2^{\frac{1}{2}} \times 4^{\frac{1}{3}} = 2^{\frac{3}{6}} \times 4^{\frac{2}{6}} =$$

$$\sqrt[6]{2^3 \times 4^2} = \sqrt[6]{8 \times 16} = \sqrt[6]{128};$$

$$\sqrt[3]{\frac{4}{2}} = \frac{4^{\frac{1}{3}}}{2^{\frac{1}{3}}} = \frac{4^{\frac{2}{6}}}{2^{\frac{2}{6}}} = \sqrt[6]{\frac{4^2}{2^2}} = \sqrt[6]{\frac{16}{8}} =$$

$$\sqrt[6]{2}.$$

If the furds have any rational coefficients, their product or quotient must

be prefixed; thus, $2\sqrt[2]{3} \times 5\sqrt[2]{6} = 10\sqrt[2]{18}$. The powers of furds are found as the powers of their quantities, by multiplying their exponents by the index of the power required; thus the square of

$$\sqrt[3]{2} \text{ is } 2^{\frac{1}{3}} \times 2 = 2^{\frac{2}{3}} = \sqrt[3]{4}; \text{ the cube of}$$

$$\sqrt[2]{5} = 5^{\frac{1}{2}} \times 3 = 5^{\frac{3}{2}} = \sqrt[2]{125}. \text{ Or you}$$

need only, in involving furds, raise the quantity under the radical sign to the power required, continuing the same ra-

dical sign; unless the index of that power is equal to the name of the furd, or a multiple of it, and in that case the power of the furd becomes rational. Evolution is performed by dividing the fraction, which is the exponent of the furd, by the name of the root required. Thus

the square root of $\sqrt[3]{a^4}$ is $\sqrt[3]{a^2}$ or $\sqrt[6]{a^4}$.

The furd $\sqrt[m]{a^m x} = a \sqrt{x}$; and, in like manner, if a power of any quantity of the same name with the furd divides the quantity under the radical sign without a remainder, as here a^m divides $a^m x$, and 25 the square of 5, divides 75 the

quantity under the sign in $\sqrt[2]{75}$ without a remainder; then place the root of that power rationally before the sign, and the quotient under the sign, and thus the furd will be reduced to a more simple

expression. Thus $\sqrt[2]{75} = 5\sqrt[2]{3}$; $\sqrt[2]{48} = \sqrt[2]{3 \times 16} = 4\sqrt[2]{3}$; $\sqrt[2]{81} = \sqrt[2]{27 \times 3} = 3\sqrt[2]{3}$.

When furds are reduced to their least expressions, if they have the same irrational part, they are added or subtracted, by adding or subtracting their rational coefficients, and prefixing the sum or difference to the common irrational part.

$$\text{Thus, } \sqrt[3]{75} + \sqrt[3]{48} = 5\sqrt[3]{3} + 4\sqrt[3]{3} = 9$$

$$\sqrt[3]{3}; \sqrt[3]{81} + \sqrt[3]{24} = 3\sqrt[3]{3} + 2\sqrt[3]{3} = 5$$

$$\sqrt[3]{3}; \sqrt[3]{150} - \sqrt[3]{54} = 5\sqrt[3]{6} - 3\sqrt[3]{6} = 2$$

$$\sqrt[3]{6}; \sqrt[3]{a^2 x} + \sqrt[3]{b^2 x} = a\sqrt[3]{x} + b\sqrt[3]{x}$$

$$= (a+b)\sqrt[3]{x}.$$

Compound furds are such as consist of two or more joined together; the simple furds are commensurable in power, and by being multiplied into themselves, give at length rational quantities; yet compound furds multiplied into themselves, commonly give still irrational products. But, when any compound furd is proposed, there is another compound furd which, multiplied into it, gives a rational product. Thus if $\sqrt{a} + \sqrt{b}$ were proposed, multiplying it by $\sqrt{a} - \sqrt{b}$, the product will be $a - b$.

The investigation of that furd, which multiplied into the proposed furd, gives a rational product, is made easy by three theorems, delivered by Mr. Maclaurin,

in his Algebra, p. 109, seq. to which we refer the curious.

This operation is of use in reducing surd expressions to more simple forms. Thus suppose a binominal surd divided by ano-

ther, as $\sqrt{20} + \sqrt{12}$, by $\sqrt{5} - \sqrt{3}$, the quotient might be expressed by

$\sqrt{20} + \sqrt{12}$. But this might be ex-

pressed in a more simple form, by multiplying both numerator and denominator, by that surd, which multiplied into the denominator, gives a rational product; thus,

$$\frac{\sqrt{20} + \sqrt{12}}{\sqrt{5} - \sqrt{3}} = \frac{\sqrt{20} + \sqrt{12}}{\sqrt{5} - \sqrt{3}} \times \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} + \sqrt{3}} = \frac{\sqrt{100} + 2\sqrt{60} + 6}{16 + 2\sqrt{60}} = 8 +$$

$2\sqrt{15}$. To do this generally, see Maclaurin, lib. cit. p. 113.

When the square root of a surd is required, it may be found, nearly, by extracting the root of a rational quantity that approximates to its value. Thus to find the square root of $3 + 2\sqrt{2}$, first calculate $\sqrt{2} = 1,41421$. Hence $3 + 2\sqrt{2} = 5,82842$, the root of which is found to be nearly $2,41421$.

In like manner we may proceed with any other proposed root. And if the index of the root, proposed to be extracted, be great, a table of logarithms

may be used. Thus $\sqrt[7]{5 + \sqrt[13]{17}}$ may be most conveniently found by logarithms.

Take the logarithms of 17, divide it by 13; find the number corresponding to the quotient; add this number to 5; find the logarithm of the sum, and divide it by 7, and the number corresponding to this quotient will be nearly equal to

$$\sqrt[7]{5 + \sqrt[13]{17}}.$$

But it is sometimes requisite to express the roots of surds exactly by other surds. Thus, in the first example, the square root of $3 + 2\sqrt{2}$ is $1 + \sqrt{2}$: for $1 + \sqrt{2} \times 1 + \sqrt{2} = 1 + 2\sqrt{2} + 2 = 3 + 2\sqrt{2}$. For the method of performing this, the curious may consult Mr. Maclaurin's Algebra, p. 115, seq. where also rules for trinomials, &c. may be found.

SURDESOLID, or SURSOLID. See the article **SURSOLID**.

SURETY, in law, generally signifies the same with bail. See the article **BAIL**.

There is also a surety of the peace, whereby a person, in danger of hurt from

another, is secured by a bond or recognizance of the offending party, and his sureties entered into to the king, and taken by a competent judge of record, &c.

SURFACE, or SUPERFICIES. See the article **SUPERFICIES**.

SURFEIT, in medicine, a sickness proceeding from the sensation of a load at the stomach, usually attended with eruptions, and sometimes with a fever.

Surfeits may be caused, says Dr. Shaw, 1. By voracity; from whence the stomach and intestines are overcharged, digestion weakened, and the chyle rendered crude or viscid, and the blood corrupted. If what was thus devoured were high seasoned or inflammatory, or happened to lie long in the body, it is supposed to cause a fever also. 2. By drinking of small liquors in hot weather, or when the body is heated by exercise; which, perhaps, chills the fluids, and gives a check to perspiration; from whence also may arise a fever and eruptions. Summer fruits likewise, as cucumbers, apples, cherries, &c. may have the same effect. 3. By too great exercise or heat, whence the fluids are rarified and thrown into too rapid a circulation, which being suddenly stopped, as may happen by cooling too fast, there ensues also a stoppage of perspiration. 4. By the state or some change of the air; as by blasts, or vehemently hot and sultry weather, or cold winds giving a sudden check to, and preventing, perspiration. See **PERSPIRATION**.

Eruptions may not appear in surfeits, either by reason of the slightness of the cause, or some wrong management at the first. Nausea's, oppression, sickness, and sometimes a vomiting and a fever, but seldom eruptions, attend on an overloaded stomach. This species of a surfeit is called *crapula*; sickness, gnawing at the stomach, sometimes eruptions and a fever attend surfeits, from the bad quality of any thing used as food. The fever always decreases as the irruptions increase; and if these suddenly disappear, the fever increases. Those surfeits, which proceed from too great exercise, or too sudden cooling after it, appear with sickness, a fever and eruptions, though the two last symptoms may be wanting. Those caused from some alteration in the air, and vulgarly called *blasts*, appear with redness of the face, spots, and a fever, often with blisters on the skin. See **FEVER**.

SURGE, in the sea-language, the same with a wave. See the article **WAVE**.

Also when heaving at the capstan, if the cable royal, or messenger slip a little, they call it surging.

SURGERY, or **CHIRURGERY**, χειρουργία, the art of curing in all manner of wounds, and other disorders, where the application of the hand, assisted by proper instruments, is necessary.

Surgery, or manual operation, is highly beneficial to mankind, since by means hereof many grievous disorders are relieved, as wounds, fractures, luxations, ulcers, &c. where diet and medicine would afford very little, and sometimes no help at all. See the articles **WOUND**, **FRACTURE**, &c.

Surgery, says Celsus, is that branch of physic which informs us how to cure or prevent disorders, by the assistance of our hands or instruments, or by the application of external remedies: thus disorders are often prevented by bleeding, scarifying, issues, setons, &c. See **PHLEBOTOMY**, **SCARIFICATION**, &c.

A thorough knowledge in anatomy is absolutely necessary for a surgeon, otherwise his actions are always uncertain, and ever obnoxious to a multiplicity of dangers. He ought also to be expert in the art of managing his hands and instruments dexterously in the performance of such operations as any case may require; as amputation, lithotomy, extirpation, cauterizing, &c. See the articles **AMPUTATION**, **LITHOTOMY**, &c.

In the days of Hippocrates, surgery was so connected with medicine, that the former was scarce distinguished from the latter by any peculiar and discriminating name; and that Hippocrates himself assisted the sick, by manual operation, is a fact which cannot be called in question. During these last fifty years, surgery has been cultivated with very great success. M. le Dran has furnished us with instructions which will inform the most skilful proficients. M. de la Faye, the ingenious commentator on Dionis, has likewise given us, in his notes, not only what his own experience and reflections have suggested, but also, as he says, the opinions and observations of the greatest surgeons at Paris; and indeed the frequent mention he makes of Mess. Moirand, Petit, de la Peyronie, and others, are sufficient proofs that his comments are an exact representation of the present state of surgery in France. M. Garengot's treatise on the operations of surgery, lies un-

der the disadvantage of having been published some years since, and before many of those improvements were made, which are now universally known: it, however, contains several cases and remarks well worth the attention of a studious reader. Heister's surgery is in everybody's hands, and the character of Heister is so well established, that any account of that work is needless. Nor need we mention the treatise of surgery, and critical enquiry, of the ingenious Mr. Sharp, since the name of the author is abundantly sufficient. If the reader desires a more particular account of chyrurgical authors, we refer him to the article **OPERATION**, to Heister's Surgery; and to Dr. James's Medical Dict. under the article **CHIRURGIA**, where he will find a very large catalogue of them.

SURIANA, in botany, a genus of the pentandria-pentagynia class of plants, the corolla of which consists of five petals, obversely ovated, patent, and of the length of the cup: there is no pericarpium except the crusts of the seeds, which are five in number, and roundish. It is a native of South America.

SURINAM, the capital of the dutch settlements in Guiana, in South America: west long. 56°, and north lat. 6° 30'.

SURMOUNTED, in heraldry, is when one figure is laid over another. As the pile surmounted of a chevron in plate CCLX. fig. 2.

SURNAME, or **SIRNAME**, a name added to the proper or baptismal name, to denote the person of such a family.

SURREBUTTER, in law, a second rebutter, or the replication of the plaintiff to the defendant's rebutter.

SURREJOINDER, is a second defence of the plaintiff's declaration by way of answer to the defendant's rejoinder.

SURRENDER, in common law, an instrument in writing, testifying that the particular tenant of lands and tenements for life or years, doth sufficiently consent and agree, that he who has the next or immediate remainder or reversion thereof, shall have the present estate of the same in possession, and that he thereby yields and gives up the same to him.

A surrender may not be made of estates in fee, nor of rights and titles only; neither can one termor regularly surrender to another. For it is ordained by statute, that no estate of freehold, or term for years, shall be granted or surrendered but by deed in writing, signed by the parties,

parties, or by operation at law, &c. See the article DEED.

Besides the usual surrender at common law, there is a customary surrender of copyhold lands, and likewise a surrender of letters-patent to the king, in order that he may grant the estate to whom he thinks meet.

SURREPTITIOUS, or **SURREPTITIOUS**. See **SURREPTITIOUS**.

SURRY, a county of England, bounded by the river Thames, which separates it from Middlesex, on the north; by Kent, on the east; by Suffex, on the south; and by Berkshire, on the west; being thirty-four miles long, and twenty-one broad.

SURROGATE, in law, denotes a person that is substituted, or appointed, in the room of another; and most commonly of a bishop, or of his chancellor.

SURSISE, in law, a name especially used for such penalties and forfeitures, as are imposed upon those persons that do not duly pay their duties or rent for castleward, in the castle of Dover.

SURSOLID, or **SURDESOLID**, in arithmetic and algebra, the fifth power, or fourth multiplication of any number or quantity considered as a root. See **ROOT**.

SURSOLID PROBLEM, in mathematics, is that which cannot be resolved but by curves of a higher nature than a conic section, *v. gr.* in order to describe a regular endecagon, or figure of eleven sides in a circle, it is required to describe an isosceles triangle on a right line given, whose angles at the base shall be quintuple to that at the vertex; which may easily be done by the intersection of a quadratrix, or any other curve of the second gender. See the articles **CURVE** and **QUADRATRIX**.

SURVEY, in law, is the ascertaining not only the boundaries and royalties of a manor, or estate in lands; but also the tenure of the respective tenants, and the rent and value of the same. In this last sense, it is taken for a court; because on the failing of an estate, consisting of manors, to a new lord, where there are tenants by lease, and copyholders, a court of survey is generally held; and sometimes upon other occasions, to apprise the lord of his right and interest.

SURVEYING, the art or act of measuring land; that is, of taking the dimensions of any tract of ground, laying down the same in a map or draught, and finding the content or area thereof.

Surveying, called also *geodæsia*, is a very

antient art; it is even held to have been the first or primitive part of geometry, and that which gave occasion to, and laid the foundation of all the rest. See the article **GEOMETRY**.

Surveying consists of three parts or members; the first is the taking of the necessary measures, and making the necessary observations on the ground itself: the second, is the laying down of these measures and observations on paper: and the third, the finding the area or quantity of ground thus laid down.

The first is what we properly call surveying: the second we call plotting or projecting, or mapping: and the third calling up. The first, again, consists of two parts, *viz.* the making of observations for the angles, and the taking of measures for the distances. The former of these is performed by some one or other of the following instruments, *viz.* the theodolite, circumferentor, semicircle, plain table, or compass: the description and manner of using each whereof, see under its respective article. The latter is performed by means either of the chain or the perambulator: the description and manner of applying each whereof, see under its respective article.

It is useful in surveying to take the angles which the bounding lines form with the magnetic needle, in order to check the angles of the figure, and to plot them conveniently afterwards.

Large maps, representing considerable extents of ground, are subject to a good many inconveniencies, especially if carried into the fields, to be compared with them; such maps become very troublesome in the wind, and it is difficult to find out the part you want. To remedy this, a general and small map of the manor, or county, &c. should be first made on one sheet of paper, the several parts may be set off on other separate sheets, and the general map being divided into as many squares as there are of these particular sheets, the relation of the whole to the several parts is easily seen; and all these maps may then be bound up in a book.

The second branch of surveying is the plotting or laying down upon paper, the several sides and angles of the figure surveyed; the manner of doing which has already been explained under the article plotting. See the article **PLOTTING**.

However, it is proper to observe, that if the lands to be plotted are hilly, and not

and found the depth of the water in various places, which insert in your map; and observe the setting of the tide, which you must represent by darts. Also the time of high-water at the full and change of the moon, must be inserted in roman numbers.

13. Lastly, in some convenient place of your map insert a scale, of the same length of that which you made use of in the projection.

SURVEYOR, a person who hath the oversight and care of considerable works, lands, or the like.

Such are the surveyor-general of the king's manors, surveyor of the king's exchange, surveyor-general of the works, surveyor-general of the crown-lands, &c.

SURVEYOR of the melting, is an officer of the mint, whose office is to see the bullion cast out, and that it be not altered after the delivery of it to the melter.

SURVEYOR of the navy, an officer whose business is to know the state of all stores, and see the wants supplied; to survey the hull, masts, and yards of ships; to audit the boatswain's and carpenter's accounts, &c.

SURVEYOR of the ordnance, is an officer whose charge is to survey all the king's ordnance, stores, and provisions of war, in custody of the store-keeper of the Tower of London; to allow all bills of debts; to keep checks on labourers and artificers works, &c.

SURVEYOR likewise denotes a gauger; as also a person who surveys lands, and makes maps of them.

SURVIVOR, in law, signifies the longest liver of joint-tenants, or of any two persons, jointly interested in a thing; in which case, if there be only two joint-tenants, upon the death of one, the whole goes to the survivor: and if there be more than two, the part of the deceased is divided among all the survivors.

SUS, the HOG-KIND, in zoology. See the article HOG.

SUS, in geography, a province of the empire of Morocco, lying on the Atlantic ocean, south of Morocco proper: its chief towns are Taradant and Taflet.

SUSA, a fortified town of Piedmont, in Italy, situated on the river Doria, on the confines of France, eighteen miles north of Turin.

SUSDAL, a city of the province of Moscow, in Russia, one hundred miles north-east of Moscow.

SUSPENCE, in law, is held to be a tem-

porary stop of a person's right; and takes place where a rent or other profit issuing out of land, on account of the unity of possession of the rent, &c. and of the land, whereout it issues, is not in esse for a time; but so as it may be revived afterwards, wherein it differs from extinguishment. See EXTINGUISHMENT.

SUSPENSION, or *Points of SUSPENSION* in mechanics, are those points in the axis or beam of a balance, wherein the weights are applied, or from which they are suspended.

In a law-sense, suspension is a species of censure, whereby ecclesiastical persons are forbidden to exercise their office, or to take the profits of their benefices; or when they are prohibited in both of them for a certain time, either in whole or in part. Suspension is also said to relate to the laity, viz. *suspensio ab ingressu ecclesie*, i. e. from hearing divine service. See the article EXCOMMUNICATION.

SUSPENSION of arms, in war, a short truce agreed on by both armies, in order to bury the dead, wait for fresh instructions, or the like.

SUSPENSION, in rhetoric, is the carrying on a period or discourse, in such a manner as to keep the reader in expectation of something considerable in the conclusion. But great care must be taken, that the reader's expectation be not disappointed; for nothing is more contemptible, than to promise much and perform little; or to usher in an errant trifle, with the formality of preface, and solemn preparation.

SUSPENSOR, in anatomy, the same with the cremaster-muscle. See CREMASTER.

SUSPICION, in law. Persons may be taken up upon suspicion, where a felony is committed, &c. however, there must be at least some reasonable grounds for the same.

SUSSEX, a county of England, bounded by Surrey and Kent on the north, by another part of Kent on the east, by the English channel on the south, and by Hampshire on the west: being sixty five miles long, and twenty-nine broad.

SUSTERN, a town of Westphalia, in Germany, ten miles south of Roermonde.

SUTHERLAND, a shire of Scotland, bounded by Cathness on the north, by the German sea on the east, by Ross-shire on the south, and by the Caledonian ocean on the west and north-west.

SUTTON SOLEFIELD, a market-town, twenty

twenty miles north-west of Warwick.

SUTTON QUADRANT. See **QUADRANT.**

SUTURE, *futura*, in anatomy, a kind of articulation peculiar to the cranium, or skull. See the article **SKULL.**

SUTURE, in surgery, a method of uniting the lips of wounds. See **WOUND.**

Sutures differ, according to the difference of wounds, but may be generally divided into the dry, bloody, and compound sutures.

1. The dry suture, called also the bastard suture, is only the application of sticking plasters, to keep the lips of the wound united: it may be used in slight wounds, and especially when they happen in the face; or, indeed, wherever it is capable of keeping the lips of the wound together: and as it gives no fresh pain, and occasions no scar, it is much fitter for wounds of the face than the needle. The plasters which are to form the dry suture, should be of a sufficient length, and shaped like the part to which they are to be applied, so as to surround the greatest part of it, but not the whole, lest they should retard the circulation of the blood, and bring on tumours and mischiefs of that kind: they must be also such as will stick very fast; the diachylon if good, or the common sticking plaster, are fittest for this purpose. The hæmorrhage being well stopped, and the wound well cleansed, some vulnerary balsam of the gummy kind, as the balsam of Peru, or the like, is to be applied, and over all a sticking plaster is to be laid, adapted to the size of the part. Two or more of these may be applied, as occasion shall require, leaving a space between; and they are to be secured in their place, by the application of proper bolsters and bandages.

Petit's method of making the suture of this kind, is by letting the plasters have one, two, or more openings in the middle, through which the surgeon may discover, as by the spaces left between in the former method, whether the lips of the wound are properly united, or not; and may also be able to apply proper remedies to the part without removing the plasters. These plasters are applied in the same manner as the former, and left on till the cure is completed.

But there is yet also another manner of performing the dry suture, *viz.* spread two plastes upon strong cloth, answering in size to the wound; to the sides or margins of these, fasten three or four tape-strings, according to the length of the

wound; and then, after warming the plasters, apply them at each side of the wound, at about a finger's breadth from it; after this, bring the lips of the wound together; dress it as in the former method, and, while an assistant keeps the lips of the wound together in a proper situation, tie the ends of the tapes, first in a single, and afterwards in a slip-knot, to keep the parts in contact; over each of these should be laid an oblong compress, and over all a large square one, and the whole kept on by a proper bandage. The day following, the wound is to be again examined, and if the tapes are loosened, they must be drawn tighter again; but if they are not loosened, let them remain untouched, and only moisten the part with a few drops of balsam, and cover them up again with the compresses and bandages, as before. Some, instead of the tape, use clasps of brass, or steel; but this method is much less convenient than the former, and therefore is little used.

2. The bloody or true suture is the uniting the lips of the wound, by means of a needle and thread: for, in large wounds, especially transverse ones, as their lips cannot be kept in their situation by means of the dry suture, which is frequently the case in wounds of the thigh, or in the abdomen, nates, or arms; or when pieces hang from the wounded part, as often happens in wounds of the forehead, cheeks, nose, or ears; or when wounds are large, and made in an angular or cruciform manner, the needle must be used, to bring their lips together; and this is called the bloody or the true suture.

To this kind of suture belong the interrupted suture, the glover's suture, and the twisted suture: the last of these is seldom used, but in cases of the harelip; and the second only in wounds of the intestines; but the first is in common use for all wounds which require the true or bloody suture.

The best method of making the common or interrupted suture, is this: take a double thread, well waxed, pass it thro' a strong crooked needle; when the lips of the wound are brought together, and held firm in their proper situation, by an assistant, with one stroke pierce thro' them both, passing the needle through the lower lip from without inwards, almost to the bottom, and so on from within outwards, observing to make the punctures

tures at a finger's breadth distance from the wound, which in this case we will suppose to be in length two fingers, varying this distance according to the size of the wound. After taking off the needle, tie the ends of the thread first in a single knot, and then in a slip-knot, covering all with the same dressings as are used in the dry future. But if the wound be so large, that one stitch will not be sufficient, then two or more are to be made, according to the length of it, at about a finger's breadth distance one from the other. To prevent the knots from bringing on any mischief, lay a small linen-compress over the single knot, and make the slip-knot over that; which, if any pain or inflammation should succeed, may be afterwards easily loosened at pleasure.

This is the method to be observed in strait, oblique, or transverse wounds; but where there are angles, as in a triangular wound, you are to proceed in the same manner, but observe to let the future begin at the angle, and the other stitches to be taken about the middle, both ways; but if the wound be quadrangular, or have two angles, like the greek letter Π , which sometimes happens in the face, then the futures must be made in both the angles; and when the wound is so large, that these are not sufficient, then as many more as are necessary must be made in the mid way between them. When you meet with a cruciform wound, and the lips of it cannot be kept together by the use of plasters, the bloody future must be made, by passing the needle through the lips, near the end of each extremity of the wound; and when all the stitches are thus made, the threads must be tied as in the other cases.

3. A kind of bloody future, which requires other assistances besides the needle and thread. It was preferred by the anti-ent surgeons to the common or interrupted future, because it prevented the lips of the wound from being lacerated, which sometimes happened when the other method was used, and not only prevented the wound from uniting, but frequently brought on other grievous disorders; and though this method has of late years been rejected, and particularly by Dionis, in his Surgery, yet many still prefer it, in several cases, to the common interrupted future: but instead of the pieces of wood, used by the anti-ents, those, who now practise it, use pieces of plaster, rolled up in a cylindrical form, of

the length of the wound, and of about the size of a goose-quill, from whence it is called by some the quilled future. This method prevents tumours, pain, and inflammations, which might be brought on by the hardness and pressure of wood.

Palfynus performs this operation, in deep wounds of the muscular parts, with a large and strong crooked needle, furnished with a double thread well waxed, which has also a bow at one end. The needle thus fitted, being passed through both lips of the wound, in the same manner as in the other operations of the true future, and afterwards a second, and a third, passed in the same manner, a roll of plaster is to be introduced into the bow-ends of the thread, which are left hanging out; then, when the needle is taken out at the other side, another roll of plaster is to be placed between the ends of the thread; and the lips of the wound being brought together, these ends are to be gently tied over the roll, first in a single, and then in a slip-knot: if there are three threads, the middle one should be tied first, and then the rest.

But, in order to illustrate this important article of surgery, we have given a plate (CCLXV.) of the instruments, and different methods, for performing the several kinds of futures; where fig. 1. is Petit's triangular needle. Fig. 2. is Heister's improvement of Petit's needle, which may be used where a strait needle cannot with safety. Fig. 3. represents a wound, the lips of which are united by a sticking plaster, indented on both sides. Fig. 4. shews a wound, to which two sticking plasters are applied. And fig. 5. a wound of the like nature, to which are applied two sticking plasters, without being indented. Fig. 6. represents a wound made cross-ways, marked A, A, A, A, and united by two plasters, laid likewise cross-ways B, B, B, B. Fig. 7. is a wound, A, A, to which a sticking plaster is applied, with two openings in the middle, marked B, B. Fig. 8. is a wound, united by the application of two plasters, with the tapes fixed to each of them; which are drawn together and fastened by slip-knots, a, a, a. Fig. 9. is a like wound, united with plasters of the same kind, only furnished with hooks, a, a, a, a, a, a, instead of tapes; by which with the assistance of threads tied to them the lips of the wound are drawn together. Fig. 10. is another method of doing the same

same thing, by means of the small eyes *b, b, b, b, b, b*, instead of the hooks, used by the antients. Fig. 11. is a transverse wound, *A, A*, united by the interrupted suture, *B, B*. Fig. 12. shews in what manner a cross wound is to be stitched up, and the lips of it brought together, by drawing the threads, *A, B, C, D*, tight. Fig. 13. shews where the stitches are to be made in a triangular wound, *A, B, C*. And fig. 14. how a wound, with two angles, is to be stitched with the interrupted suture; first, at the angles *A, A*; and then, if necessary, on each side at *B, B*. Fig. 15. is a crooked needle, with a double thread, to make the quill-suture; *A* being the needle, *B* the thread, and *C* the bow-end of the thread. Fig. 16. is a large transverse wound, *A, A*, united by the triple uninterrupted suture, *B, B, B*. Fig. 17. is the same kind of wound *D, D*, which is united by rolls of silk, *A, A, B, B*, covered with some wax or plaster, and contained in the bow-ends of the threads, *E, E, E*, which are tied with slip-knots, *C, C, C*. Fig. 18. is another method of making the quill-suture; *A, A* being the wound, *B, B* the upper-roll, *C, C* the lower roll, *D, D, D*, the single knots which confine the upper-roll, and *E, E, E*, the slip-knots which secure the lower roll. Fig. 19. represents Celsus's suture for gastroraphy; *A, A* being the beginning of the stitches, and *B, B* the end, where they are fastened in a knot: but this Heister reckons a bad method. Fig. 20. is the glovers suture, used for uniting wounds of the intestines; *A, A* being the intestine, *B, B* the wound, *C* the beginning of the suture, and *D* the end of the suture, where it is fastened in a knot. See the article **GASTRORAPHY**.

For the suture in the operation for the hare-lip, see the article **LIP**.

SWABBER, an inferior officer on board ships of war, whose employment it is to see that the decks are kept neat and clean.

SWABIA, a circle of the german empire, bounded by Franconia and the palatinate of the Rhine on the north, by Bavaria on the east, by Switzerland and Tyrol on the south, and by the river Rhine, which separates it from Alsatia, on the west; being one hundred and thirty miles long, and one hundred and ten broad.

SWAFFAM, a market town of Norfolk, twenty-three miles west of Norwich.

SWAINMOTE, or **SWANIMOTE**. See the article **SWANIMOTE**.

SWALBEA, in botany, a genus of the didynamia-angiospermia class of plants, the stigma of which is simple, and the corolla perforated: add to this, that the cup is quadrifid; the upper segment being very small, and the lower one large, and emarginated.

SWALE, a river of Yorkshire, which rising on the confines of Westmorland, runs south-east through Yorkshire, and falls into the Ouse.

SWALLEY, a port-town of India, in the province of Cambaya, twelve miles north-west of Surat.

SWALLOW, *hirundo*, in ornithology. See the article **HIRUNDO**.

SWALLOW-FISH, *hirundo*, in ichthyology. See the article **HIRUNDO**.

SWALLOW-WORT, in botany, the english name of several species of *asclepias*. See the article **ASCLEPIAS**.

SWALLOW'S TAIL, in fortification, the same with queue d'aronde. See **QUEUE**.

SWALLOW'S TAIL, in carpentry and joinery. See **DOVE-TAILING**.

SWALLOWING, or **DEGLUTITION**. See the article **DEGLUTITION**.

SWAN, *cygnus*, in ornithology. See the article **CYGNUS**.

SWANIMOTE, or **SWAINMOTE**, is a court touching matters of the forest, held thrice a year, before the verderers as judges, by the steward of the swanimote: at this court all freeholders within the forest owe suit and service; also the officers thereof are there to appear, in order to present offences. See **FOREST**.

SWANSEY, a port-town of Glamorgan-shire, situated on the Bristol channel, thirty miles west of Cardiff.

SWARDY, in agriculture, an appellation given to lands well covered with grass.

SWARM of bees, in what manner hived, see the article **HIVING**.

SWATH, *fascia*, in surgery, a long and broad bandage, for binding up any disordered limb. See **BANDAGE**.

SWEARING, an offence punishable by several statutes: thus, stat. 6 and 7 Will. III. cap. 11. ordains, that if any person shall profanely swear, if he be a labourer, servant, or common soldier, shall forfeit 1 s. to the poor, for the first offence, 2 s. for the second, &c. and any person not a servant, &c. forfeits 2 s. for the first offence, 4 s. for the second, 6 s. for the third, &c. to be levied by distress of goods.

SWEAT, *judor*, a sensible moisture issuing out of the pores of the skins of animals.

animals. See the article **PERSPIRATION**. Sweat, if it occasions no bad symptoms, is rather to be promoted than checked, even though it may seem profuse in quantity; and in this case the proper regimen is a moderate warmth, a quiet state of the body, and frequent draughts of warm liquors: but when the strength is found to be too much exhausted by these sweats, small doses of nitre are found of great service.

When different disorders arise from the suppression of sweats, nothing is of greater service than the compound powder of antimonium diaphoreticum, crab's eyes, and nitre, given in small doses, every three hours; and a quiet posture of the body is to be ordered, which greatly tends to promote sweating; and frequent draughts of warm and weak liquors are to be taken; and the bowels are to be relaxed with a clyster, or a gentle purge, if there be no symptom necessarily forbidding it. In regard to those persons, who are naturally very difficult to be sweated, a draught made of fresh arum-root and wine, or vinegar, usually brings on profuse sweating, if they are put to bed, and warm liquors drank afterwards. It is a very good general caution, that profuse sweats, if they have continued ever so many months, are never to be suppressed by astringents; for in that case they are usually attended with symptoms much worse than the original complaint. The common way of forcing out suppressed sweats by the hot alexipharmics and volatile salts, is by no means advisable in any case. Bleeding, judiciously timed, is often of very great service in promoting sweats. When the natural sweats of children are repelled, they become suddenly feverish and ill, and nothing relieves them till the sweats are recalled. This may be done simply, by keeping them warmer than before, in most cases; but when that fails, the gentle absorbents are to be prescribed; and if they suck, the nurse may take the common alexipharmic medicines: crab's eyes are as proper as any thing for the child, in this case; and for the nurse, the lapis contrayerva. The convulsions of children very often arise from the suppression of their sweats, and are always then taken off, by making them sweat again. Excessive sweating, in hectic and consumptive patients, being never salutary, should be diminished by light covering, attenuating powder of crab's eyes,

with nitre, taken in the evening, to which may be added a grain or two of storax-pills, with a sufficient quantity of whey, or butter-milk, or an emulsion.

The copious sweats at the end of intermitting fevers, as also in the crisis of other fevers, are highly beneficial; and, therefore, ought to be promoted, by lying quietly in bed, and taking a sufficient quantity of a proper fluid, with diaphoretic potions. But should the patient sweat too much after the cure of a fever, he ought to drink bitters, twice or thrice a day, with a fourth part of the essence of eleutheria; and at night to take a dose of the species of hyacinth, with a grain or two of storax-pills.

SWEATING-SICKNESS. See the article **SUDOR ANGLICANUS**.

SWEDEN, one of the most northerly kingdoms of Europe, bounded by norwegian Lapland on the north, by Russia on the east, by the Baltic sea on the south, and by Norway on the west; being upwards of eight hundred miles from north to south, and five hundred from east to west.

SWEEP, in the sea-language, is that part of the mould of a ship, where she begins to compass in at the rung-heads: also, when the hawser is dragged along the bottom of the sea, to recover any thing that is sunk, they call this action sweeping for it.

SWEET, in the wine-trade, denotes any vegetable juice, whether obtained by means of sugar, raisins, or other foreign or domestic fruit, which is added to wines, with a design to improve them. See the article **WINE**.

It is plain, says Dr. Shaw, from the making of artificial mull, or stum, by means of fine sugar, with a small addition of tartar, that the art of sweet-making might receive a high degree of improvement, by the using pure sugar, as one general wholesome sweet, instead of those infinite mixtures of honey, raisins, syrups, treacle, stum, cyder, &c. where-with the sweet-makers supply the wine-coopers, to lengthen out or amend their wines: for pure sugar being added to any poor wine, will ferment therewith, and improve it, and bring it to a proper degree of strength and vinosity. If the wine that is to be amended is tart of itself, no tartar should be added to the sugar; but if it be too sweet or luscious, then the addition of tartar is necessary.

SWEET-ALMONDS. See **ALMONDS**.

SWEET-SUBLIMATE of mercury, the same with

with *mercurius dulcis*. See the articles **MERCURY** and **CALOMEL**.

SWEET-WILLIAMS, in botany, the english name of several beautiful species of *caryophyllus*, or *dianthus*. See **DIANTHUS**.

SWELLING, in surgery. See the articles **INFLAMMATION** and **TUMOUR**.

SWERIN, a town of lower Saxony, in Germany, capital of the dutchy of Mecklenburg, and situated on the lake of Swerin, in east longit. $11^{\circ} 30'$, and north lat. 54° .

SWERNICK, a town of european Turkey, situated on the river Drino, on the confines of Servia and Bosnia : east long. 20° , north lat. $44^{\circ} 30'$.

SWERTIA, in botany, a genus of the pentandria-digynia class of plants, the corolla whereof consists of a single petal, with a plane limb, divided into five sub-lanceolated segments ; the fruit is a cylindric capsule, pointed at each end, with only one cell, in which are included numerous small seeds.

SWIFTERS, in a ship, are ropes belonging to the fore and main-shrouds, for securing those masts.

SWIFTING a boat, is encompassing her gun-wale with a strong rope : swifting a ship, is either bringing her a-ground, or upon a careen : and swifting the capstan-bars, is straining a rope all round the outer ends of them, to prevent their flying out of the drum-head.

SWIMMING, the art or act of sustaining the body in water, and of moving therein ; in which action the air-bladder and fins of fishes bear a considerable part. See the articles **AIR-BLADDER** and **FIN**.

Some have supposed, that the motion of fish in the water, depends principally upon the pectoral fins, but the contrary is easily proved by experiment ; for if the pectoral fins of a fish are cut off, and it be again put into the water, it will be found to move forward or sideways, upward or downward, as well as it did when it had them on. If a fish be carefully observed, while swimming in a basin of clear water, it will be found not to keep these pectoral fins constantly expanded, but only to open them at such times as it would stop or change its course ; this seeming to be their principal, if not their only, use. The pectoral and ventral fins, in the common fishes of a compressed form, serve in the same manner in keeping the fish still, and serve in scarce any other motion than that towards the bottom : so that this motion of the

fish, which has been generally attributed to their fins, is almost wholly owing to their muscles, and the equipoise of their air-bladder. That the use of the pectoral and ventral fins is to keep the fish steady and upright in the water, is evident from the consequences of their loss : if they are cut off, and the fish put again into the water, it cannot continue in its natural erect posture, but staggers about and rolls from side to side. The fins of the back and anus are also of great use to the keeping the creature in its natural position, as is easily seen by cutting them off, and observing the motions of the fish afterwards.

Though a great deal depends on the motion of the muscles of the several parts of the body, in the swimming of the fish, yet the tail, and those muscles which move the lower part of the body, to which it is affixed, are the great instruments by which their swift motions in the water are performed. The moving the tail, and that part of the body to which it adheres, backward and forward, or sideways any one way, throws the whole body of the fish strongly the contrary way ; and even in swimming strait forward, the motion and direction are both greatly assisted by the vibrations of this part, as may be experienced in the motion of a boat, which, when impelled forward, may be firmly guided by means of an oar held out at its stern, and moved in the water as occasion directs. The dorsal muscles, and those of the lower part of the body between the anus and tail, are the principal that are used in the motion of this part, and these are therefore the most useful to the fish in swimming. The muscles of the belly seem to have their principal use in the contracting the belly and the air-bladder. They have been supposed of use to move the belly-fins ; but there are too many of them for such a purpose, and these fins have each its peculiar muscle fully sufficient to the business. The use of the tail in swimming is easily seen, by cutting it off, and committing the fish to the water without it, in which case it is a most helpless creature.

Let A B (plate CCLXII. fig. 5. n^o 1.) be a fish swimming, by expanding or contracting its air-bladder L, it can rise or sink in the water at pleasure ; and its direct motion is performed by means of its tail B C D, vibrating from one side to another, which is performed thus ; suppose the tail in the position F G (*ibid.* n^o 2.)

2.) being about to be moved successively to H, I, and K; the fish first turns the end G, oblique to the water, and moves it quickly towards K; the resistance of the water, acting in the mean time obliquely, moves him partly forward and partly sideways, but this lateral motion is corrected by the next stroke, from K towards I, H, and G; which is performed by turning the tail obliquely the contrary way to what it was in the first stroke. By the help of the tail they also turn about, by striking strongly with it on one side, and keeping it bent, so as to act like the rudder of a ship. The fins, especially the pectoral ones E, E, serve to keep the fish upright, as also to ascend and descend.

Brutes swim naturally, but men attain this art by practice and industry: it consists principally in striking alternately with the hands and feet; which, like oars, row a person forward: he must keep his body a little oblique, that he may the more easily erect his head, and keep his mouth above water.

SWINDON, a market-town of Wiltshire, twenty-five miles north of Salisbury.

SWINE, in zoology, a general name for the sus or hog-kind. See **HOG**.

Swine are very profitable creatures to the owner, being kept at small expence, feeding on things that would be otherwise thrown away, and producing a very large increase. They are apt to dig up the ground, and break fences; but this may be prevented, by putting rings in their noses, and yokes about their necks.

For the properties of a boar, kept for breeding, see the article **BOAR**.

SWINGLING, the beating of flax, or hemp, after it has been well broken with the brake: this is done by taking up the flax in handfuls, and then beating it with a rod, or flatted and smooth stick, in order to free it from the bun, and prepare it for being heckled. See the articles **FLAX** and **HEMP**.

SWITZ, or **SWISSE**, the capital of one of the cantons of Switzerland, to which it gives name, situated on the east side of the lake of Lucern, sixteen miles south-east of the city of Lucern: east long. 8° 30', and north lat. 47°.

SWITZERLAND, or **SWISSERLAND**, called Helvetia by the Romans, is surrounded by the territories of Germany, France, and Italy, being about two hundred and sixteen miles long, and upwards of one hundred miles broad.

The several cantons or provinces of Switzerland, which are thirteen in number, have been mentioned under their respective heads **BERN**, **BASIL**, &c.

SWOLL, or **ZWOLL**, a town of the United Netherlands, situated in the province of Overysfel: east long. 6°, and north lat. 52° 37'.

SWOONING, in medicine, a species of lipothymy, wherein the patient is deprived of all sense and motion. See the article **LIPOTHYMIA**.

SWORD, *gladius*, an offensive weapon worn at the side, and serving either to cut or stab: its parts are the handle, guard, and blade; to which may be added the bow, scabbard, pummel, &c. Fencing-masters, however, divide the sword into the upper, middle, and lower part; or the fort, middle, and foible. See the article **FENCING**.

SWORD-FISH, *xiphias*. See **XIPHIAS**.

SWORD-HAND, in horsemanship. See the article **HAND**.

SYCAMORE-TREE, in botany, the english name of the acer major, or greater maple. See the article **MAPLE**.

SYCOPHANT, *συκοφαντης*, an appellation given by the antient Athenians to those who informed of the exportation of figs, contrary to law; and hence it is still used in general for all informers, parasites, flatterers, cheats, &c.

SYLLABIC AUGMENTS, in greek grammar. See the article **AUGMENT**.

SYLLABLE, *συλλαβη*, in grammar, a part of a word, consisting of one or more letters, pronounced together. See the articles **WORD** and **PRONUNCIATION**.

According as words contain one, two, three, four, &c. syllables, they are denominated monosyllables, bisyllables, trisyllables, tetrasyllables, polysyllables, &c. and the division of a word, into its constituent syllables, is called spelling. See the article **SPELLING**.

SYLLABUB, a compound liquor, made of white wine and sugar, into which is squirted new milk with a syringe. If cream be used instead of milk, it is called whipt syllabub.

SYLLABUS, in matters of literature; denotes a table of contents, or an index of the chief heads of a book or discourse.

SYLLEPSIS, in latin and greek grammar, is the agreement of a verb or adjective, not with the word next it, but with the word most worthy in the sentence.

Syllepsis is threefold: 1. Of gender, when the adjective agrees with the masculine

culine noun, preferable to the feminine; as, *rex & regina beati*. 2. Of person, when the verb agrees with the first, or second, person, preferably to the second, or third; as, *errastis, Rulle, vehementer, & tu & collegæ tui*. 3. Of number, when the adjective or verb agrees with a noun plural preferably to one singular; as *Phrygii comites & latus Julius incedunt*.

SYLLOGISM, συλλογισμός, in logic, an argument or term of reasoning, consisting of three propositions; the two first of which are called premises, and the last the conclusion. See the articles **REASONING**, **PROPOSITION**, &c.

Syllogisms are nothing but the expressions of our reasonings, reduced to form and method: and hence, as every act of reasoning implies three several judgments, so every syllogism must include three distinct propositions. Thus, in the following syllogism:

Every creature possessed of reason and liberty is accountable for his actions.

Man is a creature possessed of reason and liberty:

Therefore man is accountable for his actions.

We may observe that there are three several propositions, expressing the three judgments implied in the act of reasoning: the two first propositions answer the two previous judgments in reasoning, and are hence called premises; as being placed before the other, which is termed the conclusion. We are also to remember, that the terms expressing the two ideas whose relation we enquire after, as here, *man* and *accountableness*, are in general called the extremes; and that the intermediate idea, by means of which the agreement or disagreement of the two extremes is traced, *viz. a creature possessed of reason and liberty*, takes the name of the middle term. Hence, by the premises of a syllogism, we are always to understand the two propositions where the middle term is severally compared to the two extremes; for these constitute the previous judgments, whence the truth we are in quest of is by reasoning deduced. The conclusion is that other proposition, in which the extremes themselves are joined or separated, agreeably to what appears upon the above comparison. See **PREMISES** and **CONCLUSION**.

As, therefore, the conclusion is made up of the extreme terms of the syllogism; so that extreme, which serves as the predicate of the conclusion, goes by the name

of the major term; and the other term, or subject of the conclusion, is called the minor term. From this distinction of the extremes arises also a distinction between the premises; that proposition, which compares the greater extreme with the middle term, being called the major proposition; and the other, where the lesser extreme is compared with the middle term, being called the minor proposition. See **TERM**, **PREDICATE**, &c. In a single act of reasoning, the premises of the syllogism must be self-evident truths, otherwise the conclusion could not follow. For instance, in the major of the above-mentioned syllogism, *viz. every creature possessed of reason and liberty is accountable for his actions*, if the connection between the subject and predicate could not be perceived by a bare attention to the ideas themselves, the proposition would require a proof itself; in which case, a new middle term must be sought for, and a new syllogism formed to prove the said major: and should it so happen, that in this second essay there was still some proposition whose truth did not appear at first sight, recourse must be had to a third syllogism to prove it. And when, by conducting our thoughts in this manner, we at last arrive at some syllogism, where the premises or previous propositions are intuitive or self-evident truths; the mind then rests in full security, as perceiving that the several conclusions it has passed through stand upon the immovable foundation of self-evidence, and when traced to their source terminate in it. The great art lies, in so adjusting our syllogisms to one another, that the propositions severally made use of as premises may be manifest consequences of what goes before, so as to form one connected demonstration. See the article **DEMONSTRATION**.

With respect to the different forms or figures of syllogisms, it frequently happens that the middle term is the subject of the major term, and the predicate of the minor: but though this disposition of the middle term be the most natural and obvious, it is not, however, necessary; since the middle term is often the subject of both the premises, or the predicate in both; and sometimes it is the predicate in the major, and the subject in the minor proposition. Now this variety in the order and disposition of the middle term, constitutes what logicians call the forms or figures of syllogism. See **FIGURE**.

But

But besides this distinction of syllogisms into different figures, there is also a farther subdivision of them in every figure, called modes, or moods. See MOOD.

These distinctions of syllogism, according to figure and mood, respects chiefly simple syllogisms, or those limited to three propositions, all simple; and where the extremes and middle term are connected immediately together. But as the mind is not tied down to any one form of reasoning, but sometimes makes use of more, sometimes of fewer premises, and often takes in compound and conditional propositions, there hence arises other distinctions of syllogisms.

When in any syllogism the major is a conditional proposition, the syllogism itself is termed conditional. Such is the following one:

If there is a God, he ought to be worshipped;

But there is a God :

Therefore he ought to be worshipped.

In syllogisms of this kind, the relation between the antecedent, or the conditional part *if there is a God*, and the consequent *he ought to be worshipped*, must ever be real and true; that is the antecedent must always contain some certain and genuine condition, which necessarily implies the consequent; otherwise the proposition itself will be false, and therefore ought not to be admitted into our reasonings. There are two kinds of conditional syllogisms, one of which is called in the schools *modus ponens*; because from the admission of the antecedent they argue to the admission of the consequent, as in the syllogism above: the other is called *modus tollens*, because in it both antecedent and consequent are rejected, as in the following syllogism:

If God were not a being of infinite goodness, neither would he consult the happiness of his creatures;

But God does consult the happiness of his creatures;

Therefore he is a being of infinite goodness.

Again, as from the major's being a conditional proposition, we obtain conditional syllogisms; so where it is a disjunctive proposition, the syllogism is also called disjunctive, as in the following example.

The world is either self-existent, or the work of some finite, or some infinite being.

But it is not self-existent, nor the work of a finite being :

Therefore it is the work of an infinite being.

Now a disjunctive proposition is that, where of several predicates, we affirm one necessarily to belong to the subject, to the exclusion of all the rest, but leave that particular one undetermined: hence it follows, that as soon as we determine the particular predicate, all the rest are to be of course rejected; or if we reject all the predicates but one, that one necessarily takes place. When, therefore, in a disjunctive syllogism, the several predicates are enumerated in the major; if the minor establishes any one of these predicates, the conclusion ought to remove all the rest; or if in the minor, all the predicates but one are removed, the conclusion must necessarily establish that one.

In the several kinds of syllogisms hitherto mentioned, we may observe, that the parts are complete; that is, the three propositions of which they consist, are expressed in form. But it often happens, that some one of these premises is not only an evident truth, but also familiar and in the mouths of all men; in which case it is usually omitted, whereby we have an imperfect syllogism, that seems to be made up of only two propositions; such is the following one:

Every man is mortal;

Therefore every king is mortal.

Here the minor proposition, *every king is man*, is omitted, as being so clear and evident, that the reader may easily supply it.

SYMBOL, *συμβολον*, a sign or representation of something moral, by the figures or properties of natural things.

Hence symbols are of various kinds, as hieroglyphics, types, ænigmas, parables, fables, &c. See **HIEROGLYPHICS**, &c. Among christians, the term symbol denotes the apostles creed. See **CREED**.

SYMMETRY, *συμμετρια*, the just proportion of the several parts of any thing, so as to compose a beautiful whole.

SYMPATHETIC, something that acts, or is acted on, by sympathy: thus we say, sympathetic diseases, inks, powders, &c. See **DISEASE**, &c.

SYMPATHETIC INK. See the article *Sympathetic INK*.

SYMPATHETIC POWDER. The composition of the famous sympathetic powder, used

used at Gosselaer by the miners in all their wounds, is this. Take of green vitriol, eight ounces; of gum tragacanth, reduced to an impalpable powder, one ounce; mix these together, and let a small quantity of the powder be sprinkled on the wound, and it immediately stops the bleeding. The vitriol is to be calcined to whiteness in the sun, before it is mixed with the gum.

SYMPATHY, *συμπάθεια*, an agreement of affections and inclinations, or a conformity of natural qualities, humours, temperaments, &c. which make two persons delighted and pleased with each other. In medicine, sympathy denotes an indisposition befalling one part of the body, through the defect or disorder of another; whether it be from the affluence of some humour, or vapour sent from elsewhere; or from the want of the influence of some matter necessary to its action. See the article *CONSENT of parts*.

SYMPEXIMUM, in natural history, a genus of stones, of a fine, close, compact, and firm texture, and of a plain, uniform structure, splitting with equal ease in any direction. See the article *STONE*. Of this genus there are four different kinds, under each of which are reckoned several species. 1. The white, or whitish rock stone comprehends the dense, dull-looking, whitish symplexium; the hard, greyish, white, dull symplexium; the hard, porous symplexium; the hard, bright, grey symplexium; the hard, bright, brownish, white symplexium; the dull, yellowish, white, hard symplexium; the dull, hard, brownish, white symplexium; the whitish, grey, marbly symplexium; the yellowish, white, flinty symplexium; and the brownish, white, flinty symplexium. 2. The bluish symplexium comprehends the bluish, flinty symplexium; the hard, bluish symplexium; and the brownish, blue, dull, hard symplexium. 3. The reddish comprehends the dull, pale, red symplexium; and the hard, shining, red symplexium; and the green and red, variegated symplexium. 4. The black comprehending the hard, black, dull symplexium; the hard, black, shining symplexium; and the soft, dull, black symplexium.

SYMPHONY, *συμφωνία*, in music, properly denotes a consonance or concert of several sounds agreeable to the ear, whether vocal or instrumental, called also harmony. See the articles *HARMONY* and *CONCERT*.

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SYMPHYSIS, in anatomy, one of the kinds of junctures, or articulation, of the bones. See *ARTICULATION*.

Symphysis is twofold. 1. Without a medium, or any thing between the two bones; which coalesce or touch each other: such is the articulation in the os frontis, the upper maxilla, the ossa innominata, &c. 2. By the intervention of a medium, or substance different from the bones themselves; as in the vertebræ, the sutures of the skull, the scapula and gums. See *VERTEBRÆ*, *SKULL*, &c.

SYMPHYTUM, *COMFREY*, in botany, a genus of the pentandria-monogynia class of plants, with a monopetalous flower, quinque-dentated at the limb: there is no pericarpium; the seeds, which are four in number and gibbous, being contained in the cup.

Comfrey-root agrees in medicinal virtues with those of althæa. See the article *ALTHÆA*.

SYMPLEXIUM, in natural history, the name of a genus of fossils, of the class of the selenitæ, but not of the determinate and regular figure of most of the genera of those bodies, but composed of various irregular connections of differently shaped, and usually imperfect bodies. See the article *SELENITÆ*.

SYMPOSIARCH, *συμποσιαρχος*, in antiquity, the director, or manager of an entertainment. This office was sometimes performed by the person at whose charge the entertainment was provided; sometimes by another named by him; and at other times, especially in entertainments provided at the common expence, he was elected by lot, or by the suffrages of the guests. He was otherwise called *basilæus*, *rex*, and *modimperator*, &c. and determined the laws of good fellowship, observed whether every man drank his proportion, whence he was called *ophthalmus*, *oculus*, the eye.

SYMPTOM, *συμπτωμα*, in medicine, any appearance in a disease, which serves to indicate or point out its cause, approach, duration, event, &c. See the articles *DISEASE*, *INDICATION*, &c.

In a strict sense, however, symptom means no more than the consequences of diseases, and of their causes, exclusive of the diseases and causes themselves; and so is no other than a preternatural affection, which follows the disease, as the shadow follows the body.

SYMPTOMATICAL, in medicine, is a term often used to denote the difference between

between the primary and secondary causes in diseases: thus a fever from pain is said to be symptomatical, because it rises from pain only; and therefore the ordinary means in fevers are not in such cases to be had recourse to, but to what will remove the pain; for, when that ceases, the fever will cease without any direct means taken for it.

SYNÆRESIS, *συναίρεσις*, contraction in grammar, a figure whereby two syllables are united in one; as *veniens* for *veniens*.

SYNAGOGUE, *synagoga*, a particular assembly of Jews met to perform the offices of their religion. Also the place wherein they meet.

SYNALOEPIA, *συναλοιπη*, in grammar, a contraction of syllables, performed principally by suppressing some vowel or diphthong at the end of a word, on account of another vowel or diphthong at the beginning of the next. As *ill' ego*, for *ille ego*, &c.

SYNARTHROSIS, in anatomy, a species of articulation, wherein there is only an obscure motion, as in the bones of the carpus and metacarpus, the tarsus and metatarsus, &c. or there is no motion at all, as in the sutures of the skull, and articulations per harmoniam or bare application. See **CARPUS**, &c.

SYNCHONDROSIS, in anatomy, a species of symphysis; being the union of two bones by means of a cartilage, as in the vertebrae.

SYNCHRONISM, *συνχρονισμος*, denotes the happening of several things in the same time: for if in equal times, it is more properly called isochronism. See the article **ISOCHRONAL**.

SYNCOPIATION, in music, denotes a striking or beating of time, whereby the distinction of the several times or parts of the measure is interrupted.

However, it is more properly used for the connecting the last note of any measure, or bar, with the first of the following measure; so as only to make one note of both.

A syncope is sometimes also made in the middle of a measure.

Syncoption is also used when a note of one part ends or terminates on the middle of a note of the other part. This is otherwise denominated binding.

It is likewise used for a driving note; that is, when some shorter note at the beginning of a measure, or half measure, is followed by two, three, or more longer

notes before another short note occurs, equal to that which occasioned the driving, to make the number even, *e. gr.* when an odd crotchet comes before two or three minims, or an odd quaver before two, three, or more crotchets.

In syncoated or driving notes, the hand or foot is taken up, or put down, while the note is sounding.

SYNCOPE, **FAINTING**, in medicine, a deep and sudden swooning, wherein the patient continues without any sensible heat, motion, sense, or respiration, and is seized with a cold sweat over the whole body, and all the parts turn pale and cold as if dead. See **LIPOTHYMIA**.

SYNCOPE, in grammar, an elision or retrenchment of a letter or syllable out of the middle of a word, as *caldu* for *calidus*, *aspris* for *asperis*, &c.

SYNDESMUS, in anatomy, a word used for a ligament. See **LIGAMENT**.

In grammar, syndesmus is used for a conjunction.

SYNDIC, in government and commerce, an officer in divers countries intrusted with the affairs of a city, or other community, who calls meetings, makes representations and solicitations to the ministry, magistracy, &c. according to the exigency of the case. The syndic is appointed to answer and account for the conduct of the body, he makes and receives proposals for the advantage thereof, controuls and corrects the failings of particular persons of the body, or at least procures their correction at a public meeting. In effect, the syndic is at the same time both the agent and censor of the community. Almost all the companies in Paris, as the university, companies of arts and trades, have their syndics, and so have most of the cities of Provence and Languedoc.

Syndic is also used for a person appointed to solicit some common affair wherein he himself has a share, as happens particularly among the several creditors of the same debtor who fails or dies insolvent. The chief magistrate of Geneva is also called syndic. There are also four syndics chosen every year, the eldest of whom presides in the council of twenty-five, which is the chief council of the city, wherein all affairs are dispatched, both civil and political; thus the three other elect cannot all come at the office till the four years end, so that the syndicate rolls among sixteen persons all chosen out of the council of twenty-five.

SYNDROME, a word introduced into medicine by the empirics, who mean by it a concurrence of symptoms: thus under a plethora an empiric judges venesection necessary from a syndrome of symptoms, such as distention of the vessels, a redness and gravity of the whole body, an indisposition to motion, tensions of the limbs, and a sense of an ulcerous lassitude, besides a life spent in idleness, high and full feeding, and a suppression of wonted excretions. This is the plethoric syndrome of an empiric, and after the same manner he forms a syndrome or concurrence of symptoms in a peripneumony, quinsy, epilepsy, and other diseases. Galen ridicules these syndromes, because, he says, they happen very rarely, and also very slowly; so that should a physician wait for a syndrome of all the symptoms he expects, he might administer his remedies too late.

SYNECDOCHE, in rhetoric, a kind of figure or rather trope, frequent among orators and poets. There are three kinds of *synecdoches*; by the first, a part is taken for the whole, as the point for the sword, the roof for the house, the sails for the ship, &c. By the second, the whole is used for a part. By the third, the matter whereof the thing is made is used for the thing itself; as steel for sword, silver for money, &c. To which may be added another kind, when the species is used for the genus, or the genus for the species.

SYNECDOCHE, in greek and latin grammar, is when the ablative of a part or an adjunct of a sentence is changed into the accusative, the greek proposition *κατα*, or the latin *secundum*, or *quod ad*, being understood. Examples of the ablative of the part being changed into the accusative, are the following from Virgil. *Expleri mentem nequit*, for *quod ad mentem*; and *Deiphobum videt lacerum crudeliter ora*, for *quod ad ora*; and an example of the ablative of the adjunct being changed into the accusative from the same author, is as follows. *Flores inscripti nomina regum*, for *quod ad nomina regum*.

SYNECPHONESIS, or **SYMPHONESIS**, in grammar, a coalition whereby two syllables are pronounced as one, being much the same as the *synacopha*, or *synæresis*. See the articles **SYNALOPHA** and **SYNÆRESIS**.

SYNEDRIN, or **SYNEDRION**. See the article **SANHEDRIN**.

SYNGENESIA, *συγγενεια*, in botany, one

of Linnæus's classes of plants, the nineteenth in order; so called because the stamina in these plants grow together, or are formed into a single regular congeries.

The general characters of this class are these: the cup is the crown of the seeds, and stands on the summit of the germen; and the compound flowers are very various, in regard to the nature of the floscules. 1. Some are composed of tubulose hermaphrodite flowers in the disk, and of the same sort of tubulose hermaphrodite flowers in the radius. 2. Others are composed of tubulose hermaphrodite flowers in the disk, and of tubulose female flowers in the radius. 3. Some are composed of tubulose hermaphrodite flowers in the disk, and of tubulose neutral flowers in the radius. 4. Some have tubulose hermaphrodite flowers in the disk, and ligulated hermaphrodite flowers in the radius. 5. Some are composed of tubulose hermaphrodite flowers in the disk, and of ligulated female flowers in the radius. 6. Some are composed of tubulose hermaphrodite flowers in the disk, and ligulated neutral flowers in the radius. 7. Some are composed of tubulose hermaphrodite flowers in the disk, and of naked and neutral flowers in the radius. 8. Some are composed of tubulose male flowers in the disk, and of naked female flowers in the radius. And, 9. Some are composed of ligulated female flowers in the disk, and ligulated hermaphrodite flowers in the radius.

The stamina are five very short and slender filaments, inserted into the tube of the flower. The antheræ are of the same number with the stamina: they are slender, erect, and grow together at their sides, so as to form a tubular cylindric body of the length of the mouth of the flower, and divided into five segments at the edge. The germen of the pistil is oblong, and placed under the receptacle of the flower. The style is capillary, erect, and of the length of the stamina, and goes through the cylinder formed by the antheræ. The stigma is divided into two parts, which stand open, and bend backwards.

These plants have properly no pericarpium, though in some few species there is a coriaceous crust placed about the seed. The seed is single and oblong, often of a quadrangular figure, and sometimes narrower at the base than in any other part. However, in different gene-

ra of this class, they are of a very different appearance at the ends. Some are crowned with a downy matter, composed of a great number of single short filaments, placed circularly, or otherwise, on the head of the seed. In some the downy matter is radiated; in others it is ramose or branched; and in some it is supported on a pedicle, while in others it stands immediately on the seed. In some genera the seeds have no down at all, but have a small corona, formed of what was originally the cup of the flower. This is permanent, and divided usually into five segments. In some genera the seed is wholly naked, having neither any down nor this crown of a cup.

SYNGNATHUS, in ichthyology, a genus of the malacopterigian class of fishes, the body of which is long and very slender; sometimes it is rounded, but in most of the species it is angulated; the fins are in some species four, but in others there is only one; the head is of an oblong figure, and compressed; the jaws are closed together at the sides, and the mouth has only a small opening, which is quite at the extremity; the coverings of the gills are composed each of only one simple and very thin bony lamina.

This genus comprehends the sea-adder, or the rounded bodied syngnathus, with no pectoral nor tail fins; the syngnathus with the middle of the body heptangular, and a fin at the tail; the needle-fish, being the syngnathus with the middle of the body hexangular, and the tail pin-nated; and the sea-horse, or hippocampus. See the article **HIPPOCAMPUS**.

SYNNEUROSIS, in anatomy, a kind of articulation of the bones, performed by the intervention of ligaments. See the article **ARTICULATION**.

The synneurosis is reckoned a branch of the symphysis, and is, when the bones are connected together by a ligament, as in the os femoris to the os ischium, and the patella to the tibia. See the article **SYMPHYSIS**.

SYNCHUS, or **SYNOCHA**, in medicine, a continual fever, without any remission. See the article **FEVER**.

This species of fever, according to Hoffman, is the first in the class of inflammatory fevers. It begins without any remarkable cold or shivering, and is very violent at the first onset, and continues with little or no remission, of the symptoms, till the time of the crisis; the

pulse is great and full. See the articles **INFLAMMATION** and **INFLAMMATORY**.

The disease generally infects one part more than another; if the head, the face will swell, the eyes look red and full of tears, the head will ach with an unusual pulsation of the temporal arteries, there will be a vertigo, a drowsiness, an insensibility, and a raving; if the heart and lungs, a thick difficult respiration, anxiety, and palpitation of the heart, with loss of strength, and a dejection of mind; if the oesophagus, thirst, a dryness, and blackness of the tongue; if the stomach, a nausea, and reaching to vomit, and sometimes hiccoughing; if the bowels, inflations, costiveness, or fetid stools; if in the vessels of the mesaraic veins and arteries, a fixed pain about the vertebrae of the loins; if in the membranes of the spinal marrow, a tumbling and tossing, a numbness and weakness of the joints, and now and then convulsions. It is sometimes putrid, or malignant, with sudden loss of strength, and is not seldom attended with dusky or black spots, which threaten immediate danger. This fever often terminates spontaneously on the fourth, seventh or eleventh days, generally by a profuse sweat, or by a plentiful bleeding at the nose; in the malignant kind, by a looseness.

When it is treated rightly, at the beginning, with bleeding, and with cooling and gentle diaphoretic medicines, it often ceases on the fourth day; otherwise, according to Hoffman, it may continue till the fourteenth or seventeenth. Those to whom it turns fatal, generally die of the mortification of some noble part. Bleeding in this disease is highly necessary, and that not sparingly, if the patient's strength will bear it; then a cooling beverage, as the following: Take of spring water, two pound; of rose-water, and white-sugar, each an ounce; citron-juice, one ounce; or instead thereof, spirit of vitriol, twenty drops: of this mixture, let the patient take frequent draughts. The hartsorn jelly, with sugar, citron juice, and rose-water, are excellent in this case; as also, whey turned with citron-juice; absorbent diaphoretic powders, are likewise useful, and the body should be kept open with emollient clysters.

SYNOD, in astronomy, a conjunction, or concurrence of two or more stars, or planets, in

in the same optical place of the heavens.

SYNOD, signifies also a meeting, or assembly of ecclesiastical persons, concerning matters of religion; of these, there are four kinds, *viz.* 1. A general or universal synod, where bishops meet from all nations. 2. A national synod, where those of one nation only meet. 3. A provincial synod, where the clergy of one province assemble together. 4. A diocesan synod, where those only of one diocese assemble. See **CONVOCAATION**.

SYNODALS, or **SYNODIES**, were pecuniary rents, commonly of two shillings paid to the bishop, or archdeacon, at the time of their Easter visitation, by every parish priest. They were thus called, because usually paid in synods, for that antiently bishops used to visit and hold their diocesan synods at once; for the same reason, they are sometimes denominated synodalia, but more properly procurations.

SYNODALES TESTES, was an appellation antiently given to the urban and rural deans, from their informing against, and attesting, the disorders of the clergy, and the people in the episcopal synods. When these sunk in their authority, in their stead arose another sort of synodal witnesses, who were a kind of impannelled jury, consisting of a priest, and two or three laymen for every parish; though at length two for every diocese were annually chosen, till at last the office came to be devolved on the church-wardens. See the article **CHURCH-WARDENS**.

SYNODALE INSTRUMENTUM, a solemn oath, or engagement that these synodal witnesses took, as our church-wardens now are sworn to make just presentments. See the preceding article.

SYNODICAL, something belonging to a synod; thus synodical epistles are circular letters written by the synods to the absent prelates and churches, or even those general ones directed to all the faithful, to inform them of what had passed in the synod. For the synodical month, see the article **MONTH**.

SYNOECIA, in grecian antiquity, a feast celebrated at Athens, in memory of Theseus's having united all the petty communities of Attica into one single common-wealth, the seat whereof was Athens, where all the assemblies were to be held. This feast was dedicated to Minerva, and according to the scholiast of Thucydides, it was held in the month Metagitnion.

SYNONYMOUS, is applied to a word or term that has the same import or signification with another.

SYNONYMISTS, among botanical writers, such as have employed their care in the collecting the different names or synonyma, used by different authors, and reducing them to one another.

SYNONYMY, in rhetoric, a figure whereby synonyms, or synonymous terms, that is, various words of the same signification, are made use of to amplify the discourse.

SYNOVIA, or **SYNONIA**, in medicine, a term used by Paracelsus, and his school, for the nutritious juice, proper and peculiar to each part; thus they talk of the synovia of the joints, of the brain, &c. The mucilaginous glands of the capsulae ligamentae, and the sheaths of the tendons, excrete a mucilaginous liquor called synovia, the use of which is to keep the cartilages supple, and consequently to facilitate the motion of the tendons and joints.

Others use synovia for the gout, and other diseases in the joints, arising from a vice in the nutritious juice. Others restrain the term to the ousing out of the juice through a wounded part, especially at a joint.

SYNTAGMA, *συνταγμα*, the disposing or placing of things in an orderly manner.

SYNTAX, *συνταξις*, in grammar, the proper construction, or due disposition of the words of a language, into sentences, or phrases; or, as Buffier more accurately defines it, the manner of constructing one word with another, with regard to the different terminations thereof, prescribed by the rules of grammar. See **CONSTRUCTION** and **SENTENCE**.

Hence the office of syntax is to consider the natural suitableness of words with respect to one another, in order to make them agree in gender, number, person, mood, &c. To offend in any of these points, is called, to offend against syntax; and such kind of offence, when gross, is called a solecism, and when more slight, a barbarism. See **GENDER**, &c.

Syntax is generally divided into two parts, *viz.* concord, wherein the words are to agree in gender, number, case, and person; and regimen or government, wherein one word governs another, and occasions some variations therein. See the articles **CONCORD** and **REGIMEN**.

SYNTESIS, in medicine, an attenuation, or colligation of the solids of the body, such

such as frequently happens in atrophies, inflammations of the bowels, colliquative fevers, wherein a fatty and uligenous matter is voided with the excrements by stool. See **COLLIQUATION**, &c.

SYNTHESIS, the putting of several things together, as making a compound medicine of several simple ingredients, &c. See the article **COMPOSITION**.

SYNTHESIS, in logic, denotes a branch of method opposite to analysis, called the synthetic method. See **METHOD**.

SYNTHESIS in grammar. See **SYLLEPSIS**.

SYNTHESIS in surgery, is an operation whereby divided parts are re-united, as in wounds, fractures, luxations, &c. See the article **WOUND**, &c.

SYNTHETIC, something relating to synthesis. See the preceding article.

SYNTHETIC, or **SYNTHETICAL**, is, according to Dr. Shaw, a term given to that part of chemistry, which, after the analytical chemistry has taken bodies to pieces, or reduced them to their principles, can, from these separated principles, either recompound the same body again, or, from the mixtures of the principles of one or more bodies in various manner, form a large set of new productions, which would have been unknown to the world but for this art: such productions are brandy, soap, glass, and the like. Synthetical chemistry, taken in the strict sense for the recomposition of bodies from their own principles, is rather of philosophical than of ordinary use. This, however, is not easy, except in a few cases, nor are we to imagine, because it has been done in some, that nature has taken this way to compose them; her method of composition of bodies are a new subject, and worthy a diligent enquiry.

SYNUSIASTS, a sect of heretics, who maintained, that there was but one nature, and one single substance in Jesus Christ. The synusiasts denied, that the word assumed a body in the womb of the virgin, but held, that a part of the divine word being detached from the rest, was there changed into flesh and blood. Thus they taught, that Jesus Christ was consubstantial to the father, not only as to his divinity, but even as to his humanity and very body.

SYPHON, or **SIPHON**. See **SIPHON**.

SYRACUSE, a city and port-town of Sicily, in the province of Val de Noto, situated on a fine bay of the Mediterranean Sea, on the east coast of the island,

in east long. $15^{\circ} 5'$, north lat. $37^{\circ} 25'$. **SYREN**, or **SIREN**, in antiquity. See the article **SIREN**.

SYRIA, a part of asiatic Turkey, bounded by Natolia and Turcomania, on the north; by Diarbec or Mesopotamia on the east; by Arabia and Palestine on the south; and by the Levant-Sea on the west. The Turks divide Syria into three beglerbeglies, or vice-royalties, viz. those of Aleppo, Tripoli, and Damascus, or Scham, the seats of the respective viceroys.

SYRIAN YEAR, &c. See **YEAR**, &c.

SYRINGA, the **PIPE TREE**, in botany, a genus of the diandria-monogynia class of plants, the corolla whereof consists of a single petal, the tube is cylindric, and very long, the limb is divided into four segments of a linear figure, hollow and obtusely pointed; the fruit is an oblong compressed acuminate capsule, formed of two valves, and containing two cells. The seeds are single, oblong, and compressed, pointed at each end, and furnished with a membranaceous margin. This genus comprehends the lilac of Tournefort.

The branches of this tree, when the pith is taken out, serve for pipes in syringes.

SYRINGA, is also a name for the plant, otherwise called philadelphus. See the article **PHILADELPHUS**.

SYRINGE, an instrument serving to imbibe, or suck in a quantity of any fluid, and to squirt or expel the same with violence.

The syringe is made of an hollow cylinder *ABCD*, plate *CCLXVI*. n^o 1. furnished with a little tube at the bottom, *EF*. In this cylinder is an embolus *K*, made, or at least covered with leather, or some other matter, that easily imbibes moisture, and so filling the cavity of the cylinder, as that no air or water may pass between the one and the other. If then the little end of the tube *F*, be put into water, and the embolus drawn up, the water will ascend into the cavity left by the embolus, and upon thrusting back the embolus, it will be violently expelled again through the tube *EF*; and still the greater impetus will the water be expelled withal, and to the greater distance, as the embolus is thrust down with the greater force, or the greater velocity. See the article **EMBOLUS**.

This ascent of the water, the antients who supposed a plenum, attributed to nature's abhorrence of a vacuum; but

the moderns, from repeated experiments, have found it to be owing to the pressure of the atmosphere upon the fluid; for by drawing up the embolus, the air left in the cavity of the cylinder, will be exceedingly rarified, so that being no longer a counterbalance to the air, incumbent on the surface of the fluid, that prevails and forces the water through the little tube into the body of the syringe. See the article AIR, &c.

In effect, a syringe is only a single pump, and the water ascends in it on the same principle as in the common sucking pump, whence it follows, that the water will not be raised in a syringe to any height exceeding thirty-one feet. See the articles PUMP and SUCTION.

Syringes are of considerable uses in surgery; by them clysters are administered, injections of medicinal waters, &c. made into wounds, &c. They also serve to inject coloured liquors, melted wax, &c. into the vessels of the parts of animals, to shew the disposition, texture, ramifications, &c. thereof. The most considerable syringes used in surgery, are these following, as represented, in plate *ibid.* where n^o 1. is a syringe for various uses, furnished with pipes of different sorts. By the help of this you may not only inject fluids into wounds of the abdomen and thorax, into the fauces, into abscesses, ulcers, and to the uterus, but you may also, by the assistance of this instrument, draw extravasated blood from the cavity of the thorax, in which case the syringe should be twice as large as the mouth: the pipe should be triangular, and about two thumbs breadth: n^o 3. is another pipe, with a round mouth, intended for the same uses: n^o 4. a smaller pipe, which, as well as the rest, may be screwed on the syringe: n^o 5. another pipe somewhat curved, and perforated on both sides. This will serve to suck blood out of the cavity of the thorax, and throw injections into that part, or into the fauces: n^o 6. another perforated at the end like a cullender: n^o 7. another perforated like the former, but curved, to throw injections into the uterus, and for other uses: n^o 8. represents the syringe proper for injecting liquors into the urethra of males, and the vagina of females, for various uses: it ends with an obtuse point, to prevent the liquor from regurgitating, or flying about.

SYRINGOTOMY, in surgery, the ope-

ration of cutting for the fistula. See the article FISTULA.

SYRINGOTON, the name of an instrument to lay open the fistula.

SYRUP, or **SYROP**, in pharmacy, a saturated solution of sugar, made in vegetable decoctions, or infusions. See the article DECOCTION.

These preparations were formerly considered as medicines of much greater importance than they are thought to be at present. Syrups and distilled waters were for some ages made use of as the great alteratives, insomuch, that the evacuation of any peccant humour was never attempted, till, by a due course of these, it had first been regularly prepared for expulsion. Hence arose the exuberant collection of both, which we meet with in pharmacopœias; and like errors, have prevailed in each. As multitudes of distilled waters have been compounded from materials, unfit to give any virtue over the helm, so numbers of syrups have been prepared from ingredients which in their form cannot be taken in sufficient doses, to exert their virtues; for two thirds of a syrup consist of sugar, and the greatest part of the remaining third is an aqueous fluid.

Syrups are at present regarded chiefly as convenient vehicles for medicines of greater efficacy, and made use of for sweetening draughts and juleps, for reducing the lighter powders into bolusses, pills, or electuaries, and other like purposes; some likewise may not improperly be considered as medicines themselves, as those of saffron, or buckthorn-berries.

General rules for preparing SYRUPS. 1. All the rules for making decoctions, are likewise to be observed in making syrups; vegetables both for decoctions and infusions ought to be dry, unless they are expressly ordered otherwise. 2. In the London Pharmacopœia, only the purest, or double refined sugar, is allowed. In the Edinburgh, the less pure, or common white sugar is employed, and farther purified by the operator. For such syrups as are prepared without coction, the sugar is previously dissolved in water by itself, the solution clarified with whites of eggs, and boiled down to a thick consistence, the scum which arises during the boiling being carefully taken off. In the syrups prepared by coction, the clarification with whites of eggs is performed after the sugar has been dissolved in

In the decoction of the vegetable, except in the syrup of meconium, for which therefore, the purest sugar is directed. The purification of sugar, by clarification, and despumation, is not so perfect as might be expected, for after it has undergone this process, the refiners still separate from it a quantity of oily matter, which is disagreeable to weak stomachs. See the articles CLARIFICATION and DESPUMATION.

The clarification of the sugar along with the vegetable decoction, is likewise injurious to the medicine, since by this means not only the impurities of the sugar are discharged, but a considerable part of what the liquor had before taken up from the other ingredients. It appears therefore most eligible to employ fine sugar for all the syrups, even the purgative ones (which have been usually made with coarse sugar, as somewhat coinciding with their intention) not excepted; for as purgative medicines are in general ungrateful to the stomach, it is certainly improper to employ an addition, which increases their offensiveness.

3. Where the weight of the sugar is not expressed, twenty-nine ounces thereof is to be taken to every pint of liquor. The sugar is to be reduced into powder, and dissolved in the liquor by the heat of a water-bath, unless ordered otherwise: although in the formulæ of the several syrups, a double weight of the sugar to that of the liquor is directed, yet less will generally be sufficient. First, therefore dissolve in the liquor an equal weight of sugar, then gradually add some more in powder till a little remains undissolved at the bottom, which is to be afterwards incorporated by setting the syrup in a water-bath. The quantity of sugar should be as much as the liquor is capable of keeping dissolved in the cold; if there is more, a part of it will separate and concrete into crystals, or candy; if less, the syrup will be subject to ferment, especially in warm weather, and change to a vinous or sour liquor. 4. Copper vessels, unless they are well tinned, should not be employed in the making of acid syrups, or such as are composed of the juices of fruits. The confectioners, who are the most dextrous people at these kinds of preparations, to avoid the expense of frequently new tinning their vessels, rarely make use of any other than copper ones untinned in the preparation even of the most acid syrups, such

as that of oranges, lemons, and the like. Nevertheless, by taking due care that their coppers be well scoured and perfectly clean, and that the syrup remain no longer in them than is absolutely necessary, they avoid giving it any ill taste or quality from the metal. 5. The syrup, when made, is to be set by till next day: if any saccharine crust appears upon the surface, take it off.

SYSSARCOSIS, in anatomy, a particular species of the kind of articulation, called also symphysis. See the articles ARTICULATION and SYMPHYSIS.

The syssarcosis is a natural union of two bones by means of flesh or muscles, such is that of the os hyoides and omoplate.

Syssarcosis is also used by some surgical writers to express a method of curing wounds of the head when the cranium is laid bare, and the interstice between the lips of the wound too wide for a contraction, by means of promoting the granulation or growth of new flesh.

SYSTEM, *sistema*, in general, denotes an assemblage or chain of principles and conclusions, or the whole of any doctrine, the several parts whereof are bound together and follow or depend on each other; in which sense we say, a system of philosophy, a system of divinity, &c.

SYSTEM, in astronomy, denotes an hypothesis or supposition of an arrangement of the several parts of the universe, whereby astronomers explain all the phenomena or appearances of the heavenly bodies, their motions, changes, &c. This is more properly called the *systeme* of the world. *Sytem* and *hypothesis* have much the same signification, unless perhaps hypothesis be a more particular system, and system a more general hypothesis. See the article HYPOTHESIS.

The three most celebrated systems of the world are the copernican, the ptolemaic, and tyconic, the oeconomy of each whereof may be seen under the articles COPERNICAN, PTOLEMAIC, and TYCHONIC.

SYSTEM, in poetry, denotes a certain hypothesis, or scheme of religion, from which the poet is never to recede: *e. gr.* having made his choice either in the heathen mythology or in christianity, he must keep the two apart, and never mix such different ideas in the same poem.

SYSTEM, in music, denotes a compound interval, or an interval composed, or conceived to be composed, of several less, such

such as the octave. See INTERVAL.

The word is borrowed from the antients, who call a simple interval, *diastem*; and a compound one, *system*. See the article *DIATEM*.

As there is not any interval in the nature of things, so we can only conceive any given interval as composed of, or equal to, the sum of several others: this division of intervals therefore only relates to practice, so that a system is properly an interval which is actually divided in practice, and where along with the extremes we always conceive some intermediate terms. The nature of a system will be very plain by conceiving it an interval whose terms are in practice taken either in immediate succession, or the sound is made to rise or fall from one to the other, by touching some intermediate degrees, so that the whole is a system or composition of all the intervals between one extreme and another. Systems of the same magnitude, and consequently of the same degree of concord and discord, may yet differ in respect of their composition, as containing, and being actually divided into more or fewer intervals; and when they are equal in that respect, the parts may differ in magnitude. Lastly, when they consist of the same parts or lesser intervals, they may differ as to the order and disposition thereof between the two extremes.

There are several distinctions of systems, the most remarkable of which are concinnous or inconcinnous. Concinnous systems are those which consist of such parts as are fit for music, and those parts placed in such an order between the extremes, as that the succession of sounds from one extreme to the other, may have a good effect. See CONCINNOUS.

The concinnous systems, according to Euclid, are diatessaron, diapente, diapasos; diapasos and diatessaron, diapasos and diapente, and bisdiapasos. See DIATESSARON, DIAPENTE, &c.

Inconcinnous systems are those wherein the simple intervals are inconcinnous, or badly disposed between the two extremes. The inconcinnous, that author observes, are less than the fourth, and all those situated between the above-mentioned ones.

A system is either particular or universal. An universal system is that which contains all the particular systems belonging to music, and makes what the antients call *diagram*, and we, the scale of music,

See *DIAGRAM*, *SCALE*, *GAMUT*, &c.

The antients also distinguish systems into perfect and imperfect. The bisdiapasos, or double octave, was reckoned a perfect system, because, within its extremes are contained examples of all the simple and original concords, and all the variety of orders wherein their concinnous parts ought to be taken, which variety constitutes what they call species or figures of consonances. All the systems less than the bisdiapasos were reckoned imperfect. The double octave was called *systema maximum* and *immutatum*, because they took it to be the greatest extent or difference of time they could go in making melody, though some added a fifth to it for the greatest system: but the diapasos, or simple octave, was reckoned the most perfect system with regard to the agreement of its extremes, so that how many octaves soever were put into the greatest system, they were all to be constituted or subdivided the same way as the first; so that when we know how the octave is divided, we know the nature of the diagram or scale, the varieties whereof constitute the genera melodice, which are subdivided into species. See the articles *GENUS* and *SPECIES*.

SYSTEMATISTS, in botany, those authors whose works in this science are principally employed about the arranging plants into certain orders, classes, or genera.

SYSTOLE, in anatomy, the contraction of the heart, whereby the blood is drawn out of its ventricles into the arteries; the opposite state to which is called the diastole, or dilatation of the heart. See the articles *HEART*, *BLOOD*, *DIASTOLE*, *PULSE*, &c.

The systole of the heart is well accounted for by Dr. Lower, who shews that the heart is a true muscle, the fibres whereof are acted on like those of other muscles, by certain branches of the eighth pair of nerves inserted into it, which bring the animal spirits from the brain hither. By a flux of these spirits the muscular fibres of the heart are inflated and thus shortened, the length of the heart diminished, its breadth or thickness increased, the capacity of the ventricles closed, the tendinous mouths of the arteries dilated, those of the veins shut up by means of their valves, and the contained juice forcibly expressed in the orifices of the arteries. See the article *MUSCLE*, &c.

Dr. Drake adds to **Dr. Lower's** account, that the intercostal muscles and diaphragm contribute to the systole, by opening the blood a passage from the right ventricle of the heart to the left, through the lungs, to which it could not otherwise pass, because the opposition the blood contained in that ventricle must necessarily have made to its constriction, is taken off. Both these authors make the systole the natural state, or action of the heart, and the diastole the violent one. **Boerhaave**, on the contrary, makes the systole the violent, and the diastole the natural state. See the articles **CIRCULATION**, **CONTRACTION**, **ARTERY**, &c.

SYSTYLE, in architecture, that manner of placing columns where the space between the two fusts consist of two diameters, or four modules. See the articles **COLUMN**, **DIAMETER**, and **MODULE**.

SYZYG, *syzygia*, in astronomy, a term equally used for the conjunction and opposition of a planet with the sun. See **CONJUNCTION** and **OPPOSITION**.

On the phenomena and circumstances of the syzygies a great part of the lunar theory depends. See the article **MOON**.

For, §. It is shewn in the physical astronomy, that the force which diminishes the gravity of the moon in the syzygies, is double that which increases it in the quadratures: so that in the syzygies the gravity of the moon from the action of the sun is diminished by a part which is to the whole gravity as 1 to 89,36: for in the quadratures, the addition of gravity is to the whole gravity as 1 to 778,73. See the article **QUADRATURE**.

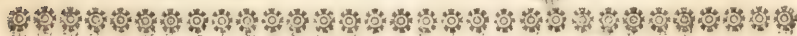
2. In the syzygies, the disturbing force is directly the distance of the moon from the earth, and inversely as the cube of the distance of the earth from the sun. And at the syzygies the gravity of the moon towards the earth receding from its center is more diminished, than according to the inverse ratio of the square of the distance from that center. Hence, in the motion of the moon from the syzygies to the quadratures, the gravity of the moon towards the earth is continually increased, and the moon is continually retarded in its motion; and in the motion from the quadratures to the syzygies the moon's gravity is continually diminished, and its motion in its orbit accelerated. See the article **GRAVITATION**.

3. Further in the syzygies the moon's orbit, or circle, round the earth, is more convex than in the quadratures, for which reason the moon is less distant from the earth at the former than the latter. When the moon is in the syzygies, her apses go backwards, or are retrograde. See the articles **ORBIT**, **APSIS**, and **RETROGRADATION**.

When the moon is in the syzygies, the nodes move in antecedentia fastest: then slower and slower, till they become at rest, when the moon is in the quadratures. See the article **NODE**.

Lastly, When the nodes are come to the syzygies, the inclination of the plane of the orbit is least of all. See the article **INCLINATION**.

Add that these several irregularities are not equal in each syzygy, but all somewhat greater in the conjunction than in the opposition.



T.

T, or *t*, the nineteenth letter, and fifteenth consonant of our alphabet, the sound whereof is formed by a strong expulsion of the breath through the mouth, upon a sudden drawing back of the tongue from the fore part of the palate, with the lips at the same time open. The proper sound of this letter is that in *tan*, *ten*, *tin*, *tun*, *fat*, *pat*, *put*, &c. When it comes before *i*, followed by a vowel, it is sounded like *s*, as in *nation*, *potion*, &c. When it comes after *i*, it has a twofold sound;

one clear and acute, as in *thin*, *thief*, &c. the other more obtuse and obscure, as in *then*, *there*, &c.

In abbreviations, amongst the roman writers, **T.** stands for **Titus**, **Titius**, &c. **Tab.** for **Tabularius**; **Tab. P.H.C.** **Tabularius provincie Hispanie citerioris**; **Tar.** **Tarquinius**; **Ti.** **Tiberius**; **Ti. F.** **Tiberii filius**; **Ti. L.** **Tiberii libertus**; **Ti. N.** **Tiberii Nepos**; **T. J. A.** **V. P. V. D.** **tempore judicem arbitrumve postulat ut det**; **T.M.P.** **terminum posuit**; **T.M. DD.** **terminum dedicavit**;

Tr. trans, tribunus; Tr. M. or Mil. tribunus militum; TR. PL. DES. tribunus plebis designatus; TR. AER. tribunus ærarii; TRV. CAP. triumviri capitales; T. P. or TRIB. POT. tribunicia potestate; Tul. H. Tullus Hostilius.

Amongst the antients, T. as a numeral, stood for one hundred and sixty; and with a dash at top, thus T̄, it signified one hundred and sixty thousand. In music, T stands for tutti, all, or altogether.

TABAGO, one of the Caribbee-islands in the American ocean, one hundred and twenty miles south of Barbadoes: west longitude 59°, north latitude 11° 30'.

It is from this place that tabacco, or tobacco, a well known plant, takes its name. See the article TOBACCO.

TABARCA, an island on the coast of Barbary, in Africa, fifty miles west of Tunis: east long. 8°, north lat. 36° 30'.

TABASCO, the capital of a province of the same name, situated on the bay of Campeachy, at the mouth of the river Tabasco, one hundred and sixty miles south-west of Campeachy: west long. 95°, north lat. 18°.

TABBY, in commerce, a kind of rich silk which has undergone the operation of tabbying. See the next article.

TABBYING, the passing a silk or stuff under a calender, the rolls of which are made of iron or copper, variously engraved, which bearing unequally on the stuff renders the surface thereof unequal, so as to reflect the rays of light differently, making the representation of waves thereon.

TABELLA, **TABLET**, in pharmacy, is much the same with troches and lozenges, being a solid preparation formed into a little cake, or mass, of different figures, intended to dissolve slowly, and generally made agreeable to the palate. This form is mostly made use of for the more commodious exhibition of certain medicines, by sitting them to dissolve slowly in the mouth, so as to pass by degrees into the stomach, and hence these preparations have generally a considerable proportion of sugar or other such materials. They are calculated for children who are not easily prevailed on to take medicines in less agreeable forms. There are various kinds of them, as the *tabellæ antacidæ*, *tabellæ anthelminticæ*, *tabellæ gurgantes*, &c. See TROCHE.

TABELLIO, in the roman law, an offi-

cer or scrivener, much the same with our notaries public, who are often called tabelliones in our antient law books. See the article NOTARY.

TABERNACLE, among the Hebrews, a kind of building, in the form of a tent, set up, by express command of God, for the performance of religious worship, sacrifices, &c. during the journeying of the Israelites in the wilderness; and, after their settlement in the land of Canaan, made use of for the same purpose till the building of the temple of Jerusalem. It was divided into two parts, the one covered, and properly called the tabernacle; and the other open, called the court. The curtains which covered the tabernacle were made of linen, of several colours, embroidered. There were ten curtains, twenty-eight cubits long and four in breadth. Five curtains fastened together made up two coverings; which covered all the tabernacle. Over these there were two other coverings; the one of goat-hair, and the other of sheepskins. The holy of holies was parted from the rest of the tabernacle by a curtain made fast to four pillars, standing ten cubits from the end. The length of the whole tabernacle was thirty-two cubits, that is, about fifty feet; and the breadth twelve cubits, or nineteen feet. The court was a spot of ground one hundred cubits long, and fifty in breadth, enclosed by twenty columns; each twenty cubits high and ten in breadth, covered with silver, and standing on copper bases; five cubits distant from one another; between which, there were curtains drawn, and fastened with hooks. At the east end was an entrance, twenty cubits wide, covered with a curtain hanging loose.

Feast of TABERNACLES, a solemn festival of the Hebrews, observed after harvest, on the fifteenth day of the month Tisri, instituted to commemorate the goodness of God, who protected the Israelites in the wilderness, and made them dwell in booths, when they came out of Egypt. On the first day of the feast, they began to erect booths of the boughs of trees, and in these they were obliged to continue seven days. The booths were placed in the open air, and were not to be covered with cloths; nor made too close by the thickness of the boughs; but so loose that the sun and the stars might be seen, and the rain descend through them. For further particulars, as to the celebration of this festival, see Levit. ch. xxiii.

TABERNÆMONTANA, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of a single infundibuliform petal: the tube is cylindric and long: the base and apex are both ventricose: the limb is divided into five linear obtuse segments; the fruit is composed of two follicles bent horizontally, ventricose, and acuminate, formed of one valve, and containing one cell: the seeds are numerous, of an oblong oval figure, obtuse, imbricated, and wrapped up in pulp.

TABES DORSALIS, in medicine, a distemper which, according to a late author, is a particular species of a consumption, the proximate cause of which is a debility of the nerves. See the article **CONSUMPTION**.

Of the several kinds of consumptions incident to human bodies, the *tabes dorsalis* is the slowest in its progress, but the most melancholy in its circumstances; and, unless timely obviated, for the most part fatal. This disease is only incident to young men of salacious dispositions, and proceeds from too early venery, an immoderate use of it, or pollutions. It seems therefore to derive its origin from too frequent venereal spasms; and the immoderate loss of seminal fluid has a considerable share in producing the effect. The symptoms of the *tabes dorsalis* are involuntary, nocturnal, seminal emissions, a pain in the back, and often in the head, a formication of the spine, an aching pain, rolling and hanging down of the testicles, a weakness of memory and sight, and a mucous discharge from the urethra, especially after straining at the discharge of the excrements. The mucous discharge here mentioned is called, by Hippocrates, *liquidum semen*, but it is nothing but the mucus of the prostrate gland. This disease is farther attended with great melancholy and dejection of mind, and a gutta serena often follows. The eyes grow hollow, the visage meagre and thin, the body emaciated and weak, a palpitation of the heart, and shortness of breath, succeed with a concurrence of hectic complaints, ending in death.

For the cure of this distemper a regularity of the non-naturals is of the utmost importance. Good air, rather cool than hot, is of great use. As to diet, high-seasoned meats, spirituous and fermented liquors, should be avoided. No

food is so beneficial as milk: chocolate is also esteemed good, in such quantities as to sit easy on the stomach. Animal food of easy digestion, at dinner, does no harm. Suppers should be avoided, at least milk only should be then taken, about two hours before going to bed. Sleep must be little, and in due season; that is, the patient should go to bed and rise early. Indulgence in bed in a morning is hurtful. The general rule should be to rise immediately upon waking; which, though irksome at first, will by custom be made familiar and agreeable. Moderate exercise, or such as the patient's strength will admit of without weariness, ought to be used. Some recommend riding, especially a long journey, by such daily portions as to avoid extraordinary fatigue. The secretions of the body, if out of order, should be regulated, and the patient should be entertained with cheerful company. As to the medicines, the classes of balsamics and astringents are chiefly useful. Among the latter, the peruvian bark, either in substance, extract, or tincture, the acid elixir of vitriol, and the tincture saturnia, or antiphthisica, are the most efficacious. Strengthening plasters may also be laid on the loins; and, chief of all, the cold bath should be used.

TABLATURE, in anatomy, a division, or parting, of the skull into two tables. See the article **SKULL**.

TABLATURE, *tablatura*, in music, is, in general, when, to express the sounds or notes of a composition, we use the letters of the alphabet, or any other characters not used in the modern music.

But, in a stricter sense, tablature is the manner of writing a piece for the lute, theorba, guitar, viol, or the like, which is done by writing on several parallel lines, (each of which represents a string of the instrument) certain letters of the alphabet, whereof **A** marks that the string is to be struck open, that is, without putting the finger of the left hand upon the neck; **B** shews that one of the fingers is to be put on the first stop, **C** on the second, **D** on the third, and so on through the octave. The tablature of the lute is usually wrote in letters of the alphabet, and that of the harpsicord in the common notes.

TABLE, *tabula*, a moveable piece of furniture, usually made of wood or stone, and supported on pillars, or the like, for the

the commodious reception of things placed thereon.

TABLE, in architecture, a smooth simple member, or ornament, of various forms, but most usually in that of a long square. A projecting-table is that which stands out from the naked of the wall, pedestal, or other matter it adorns. Raked-table, is that which is hollow in the die of a pedestal, or elsewhere, and is usually encompassed with a moulding. Razed-table, is an embossment in a frontispiece for the putting an inscription, or other ornament, in sculpture. This is what M. Perrault understands by abacus in Vitruvius. Crowned-table, that which is covered with a corniche, and in which a basso relievo is cut, or a piece of black marble incrustated for an inscription. Rusticated-table, that which is picked, and whose surface seems rough, as in grottos, &c.

TABLE, in perspective, denotes a plain surface, supposed to be transparent, and perpendicular to the horizon. It is always imagined to be placed at a certain distance between the eye and the objects, for the objects to be represented thereon by means of the visual rays passing from every point thereof through the table to the eye; whence it is called perspective-plane.

TABLE, in anatomy. The cranium is said to be composed of two tables, or laminæ, *i. e.* it is double, as if it consisted of two bones laid over one another. See the article **SKULL**.

TABLE of Pythagoras, or *Multiplication-TABLE*. See **MULTIPLICATION**.

Laws of the twelve TABLES, were the first set of laws of the Romans, thus called either by reason the Romans then wrote with a style on thin wooden tablets covered with wax, or rather, because they were engraven on tables, or plates of copper, to be exposed in the most noted part of the public forum. After the expulsion of the kings, as the Romans were then without any fixed or certain system of law, at least had none ample enough to take in the various cases that might fall between particular persons, it was resolved to adopt the best and wisest laws of the Greeks. One Hermodorus was first appointed to translate them, and the decemviri afterwards compiled and reduced them into ten tables. After a world of care and application, they were at length enacted and confirmed by the senate and an assembly of the people,

in the year of Rome 303. The following year they found something wanting therein, which they supplied from the laws of the former kings of Rome, and from certain customs which long use had authorized: all these being engraven on two other tables made the laws of the twelve tables, so famous in the roman jurisprudence, the source and foundation of the civil or roman law.

TABLES of the law, in jewish antiquity, two tables on which were written the decalogue, or ten commandments, given by God to Moses on Mount Sinai. See the article **DECALOGUE**.

Many questions have been started about these tables, as concerning their matter, form, number, author, and contents. Some suppose them to have been made of wood, others of precious stone. These again are divided; some supposing them to have been of ruby, and others of carbuncle. Some oriental authors pretend they were ten in number, and others seven, but the Hebrews acknowledge no more than two. Moses observes, that these tables were written on both sides: many think they were transparent, so that they might be read through: others are of opinion that the same ten commandments were written on each of the two tables: and others, that the ten were divided, five being written on one table and five on the other. Moses expressly says that these tables were written by the hand of God. Some understand this literally, others ascribe it to the ministry of an angel, and others explain it by an order of God to Moses himself, to write them. The Mahometans say that God commanded the archangel Gabriel to make use of the pen, which is the invocation of the name of God, and of the ink which is taken out of the river of light, and therewith to write the tables of the law. When Moses brought these tables down from the mount, and saw the idolatry into which the children of Israel had fallen, he dropt them out of his hand, and by the fall they were broken to pieces; but this loss was repaired by the second table which God gave to Moses, and in which he commanded him to write down the words of the covenant which he had made with Israel. From hence some conclude that these latter tables were not written by the hand of God, though the first were. But Moses takes express notice that God himself wrote them; whence it follows either

ther that they were both written by the finger of God, or that neither of them was so written.

New TABLES, *tabule novæ*, an edict occasionally published in the roman commonwealth, for the abolishing all kinds of debts and annulling all obligations.

TABLE, among the jewellers. A table-diamond, or other precious stone, is that whose upper surface is quite flat, and only the sides cut in angles; in which sense a diamond, cut table-wise, is used in opposition to a rose-diamond. See the article **DIAMOND**.

TABLE-GLASS. See the article **GLASS**.

TABLE is also used for an index or repository put at the beginning or end of a book, to direct the reader to any passage he may have occasion for: thus we say table of matters, table of authors quoted, &c. Tables of the Bible are called concordances: See **CONCORDANCE**.

TABLE of houses, among astrologers, certain tables ready drawn up for the assistance of practitioners in that art, for the erecting or drawing of figures or schemes. See the article **HOUSE**.

TABLE, in mathematics, system of numbers calculated to be ready at hand for the expediting astronomical, geometrical and other operations: thus we say tables of the stars; tables of sines, tangents, and secants; tables of logarithms, rhumbs, &c. sexagenary tables; loxodromic tables, &c. See the articles **CANON**, **CATALOGUE**, **LOGARITHMS**, **RHUMB**, **SEXAGENARY**, &c.

Astronomical TABLES, are computations of the motions, places, and other phenomena of the planets, both primary and secondary.

The oldest astronomical tables are those of Ptolomy, found in his *Almagest*; but these now agree no longer with the heavens. In 1252, Alphonso XI. king of Castile, undertook the correcting them, whence arose the alphonine tables: but the deficiency of these was soon perceived by Regiomontanus and Purbachius; upon which the former of these, and after him Waltherus, and Warnerus, applied themselves for the further amending them: but died before they finished them. Copernicus calculated tables from his own observations and theories, from which Erasmus Reinholdus afterwards compiled the prutenic tables. From Tycho's theories, Longomontanus calculated tables, now called the Danish Tables: and Kepler like-

wise, from the same, in 1627, published the Rudolphine Tables, which are now much esteemed. These were afterwards, in 1650, turned into another form by Maria Cunitia, whose astronomical tables, comprehending the effect of Kepler's Physical Hypothesis, are exceedingly easy, and satisfy all the phenomena without any trouble of calculation, or any mention of logarithms, so that the Rudolphine calculus is hereby greatly improved. Other tables are the philolaic tables of Bullialdus; the britannic tables of Vincent Wing, calculated on Bullialdus's hypothesis; the britannic tables of John Newton; the french ones of count de Pagan; the caroline tables of Street, all calculated on Dr. Ward's hypothesis; and the novalmagnetic tables of Ricciolus. Amongst these last, the philolaic and caroline tables are esteemed the best. Among the latest tables are the ludovician, published in 1702, by M. de la Hire, wholly from his own observations, and without the assistance of any hypothesis; those of Cassini in 1738; and Dr. Halley laboured to perfect another set of tables.

TABLE, in heraldry. Coat, or escutcheons containing nothing but the mere colour of the field, and not charged with any bearing or moveable, are called *tables d'attente*, tables of expectation, or *tabule rase*.

TABLET, *tabella*, in pharmacy. See the article **TABELLA**.

TABLING of fines, the making a table for every county, where his majesty's writs run, containing the contents of every fine passed each term. This is to be done by the chirographer of fines of the court of common pleas, whose duty it is every day of the next term, after the ingrossing of any such fine, to fix these tables in some open place of the said court, during the time of its sitting; and he is likewise to deliver to the sheriff of every county, his under-sheriff, or deputy, fairly wrote in parchment, a perfect copy of the table so made for that county, in the term next after the affizes, to be set up in an open place of that court, and to continue there so long as the justices shall sit, and in case either the sheriff, or chirographer, fails herein, he is liable to 5 l. penalty.

TABOR, *taburin*, a small drum. See the article **DRUM**.

TABORITES, or THABONITES, a branch or sect of the ancient Iussites. They carried

carried the point of reformation farther than Hufs had done, rejected purgatory, auricular confession, the unction of baptism, transubstantiation, &c. They reduced the seven sacraments of the Romanists to four, *viz.* baptism, the eucharist, marriage, and ordination.

TABRISTAN, a province of Persia, situated on the northern shore of the caspian sea, having the province of Astrabat on the east, and Gilan on the west; being part of the antient Hyrcania.

TACAMAHACA, in pharmacy, a solid resin, improperly called a gum, in the shops: it is of a fragrant and peculiar smell, and is of two kinds; the one called the shell-tacamahaca, which is the finest; the other, which is an inferior kind, being termed rough-tacamahaca, or tacamahaca in grains.

The shell-tacamahaca is a concreted resin, of a fatty appearance, and somewhat soft, so as easily to receive an impression from the finger; at least this is its state, when tolerably fresh. In time it grows hard and friable as common resin; but it is then to be rejected, as having lost much of its virtue. It is of a pale, brownish, white colour, sometimes with a yellowish, sometimes with a greenish cast. It is moderately heavy, very inflammable, and of a very fragrant smell of a peculiar kind, in which something like the aromatic scent of lavender, and the perfume of amber-grease, may be distinguished, as mixed with a resinous flavour. Its taste is very aromatic and agreeable, though very acrid.

The common or grain-tacamahaca, called also coarse tacamahaca, by way of distinction from the former fine kind, which is called tacamahaca sublimis by some, is a dry, but somewhat fattish resin, sent over to us either in loose granules, or in masses formed of such. It is of a whitish colour variegated with yellowish, reddish, or greenish spots. Some of the granules are simply of one or other of these colours; others are variegated with two or more of them. It is of a fragrant smell, resembling that of the shell-tacamahaca, but less perfumed, and is of an acrid, aromatic, bitterish taste.

Tacamahaca is the gum of a tall tree, in the manner of its growth much resembling the poplar: its leaves are broad and serrated at the edges, and terminate in a sharp point: the flowers have not been yet described, but it is said to be

small and roundish, containing a kernel not unlike that of a peach-stone.

Some greatly commend tacamahaca in disorders of the breast and lungs; but, at present it is very rarely used internally. Externally, however, it is in repute for softening tumours, and mitigating pain and aches. Applied to the navel, it is said to relieve women in hysteric complaints; and applied in the same manner to the region of the stomach, it assists digestion, and expels flatulences: it is also an ingredient in some of the shop-compositions.

TACHYGRAPHY, *ταχυγραφία*, the art of writing fast, or of short-hand; of which authors have invented several methods. See **BRACHYGRAPHY**.

TACK, in a ship, a great rope having a wale-knot at one end, which is seized or fastened into the clew of the sail; so is reefed first though the chesse-trees, and then is brought through a hole in the ship's side. Its use is to carry forward the clew of the sail, and to make it stand close by a wind: and whenever the sails are thus trimmed, the main-tack, the fore-tack, and mizen-tack, are brought close by the board, and haled as much forward on as they can be.

The bowlings also are so on the weather-side; the lee-sheets are haled close aft, and the lee-braces of all the sails are likewise braced aft. Hence they say, a ship sails or stands close upon a tack, *i. e.* close by the wind. The words of command are, hale aboard the tacks, *i. e.* bring the tack down close to the chesse-trees. Ease the tack, *i. e.* slacken it, or let it go, or run out. Let rise the tack, *i. e.* let all go out.

The tacks of a ship are usually belayed to the bits, or else there is a chevil on purpose to fasten them.

TACK-ABOUT, in the sea-language, is to turn the ship about, or bring her head about, so as to lie the contrary way.

TACKLE, or **TACKLING**, among seamen, denotes all the ropes or cordage of a ship, used in managing the sails, &c. In a more restrained sense, tackles are small ropes running in three parts, having at one end a pendant and a block; and at the other end, a block and hook, to hang goods upon that are to be heaved into the ship or out of it. See **SHIP**.

TACTICS, in the art of war, is the method of disposing forces to the best advantage in order of battle, and of performing

forming the several military motions and evolutions.

TADCASTER, a market-town of Yorkshire, ten miles south-west of York.

TADMOR, the same with Palmyra. See the article **PALMYRA**.

TADORNA, in ornithology, a beautiful species of anas, nearly equal to the goose in size, and variegated with white, and with a longitudinal spot of grey on the belly : it is frequent on the coasts of Wales and Lancashire.

TADPOLE, a young frog, before it has disengaged itself from the membranes that envelope it in its first stage of life. See the article **FROG**.

TÆNIA, the **TAPE-WORM**, in zoology, a genus of worms, the body of which is of an oblong form, and composed of evident joints or articulations, in the manner of the links of a chain, or beads of a necklace.

The tape-worm grows frequently to several ells in length, and its articulations are a third of an inch long each. There is also another small species, which never exceeds two inches in length, and is commonly not more than half an inch.

TÆNIA, in architecture, a member of the doric capital, resembling a square fillet, or reglet : it serves instead of a cymatium. See **CYMATIUM**.

TAFALA, a town of Navarre, in Spain, twenty-two miles south of Pampeluna : west long. $1^{\circ} 40'$, north lat. $42^{\circ} 45'$.

TAFFAREL, or **TAFFEREL**, in a ship, the uppermost rail or frame, abaft over the poop. See the article **SHIP**.

TAFFETY, in commerce, a fine smooth silken stuff, remarkably glossy. See **SILK**. There are taffeties of all colours, some plain, and others striped with gold, silver, &c. others chequered, others flowered, &c. according to the fancy of the workmen.

TAFILET, a town of Biledulgerid, in Africa, situated three hundred miles south-east of Morocco : west long. 3° , north lat. 28° .

TAGETES, *French* **MARYGOLD**, or *African* **MARYGOLD**, in botany, a genus of the syngenesia-polygamia superflua class of plants, with a compound radiated flower, made up of numerous tubulose and semiquinifid hermaphrodite corollulæ on the disc, and several ligulated female flowers in the radius or verge : there is a single seed succeeds each hermaphrodite corollula ; all which are contained in the cup, which closes for that

purpose. See plate **CCLXVIII. fig. 1**. **TAGUS**, the largest river of Spain, which taking its rise on the confines of Arragon, runs south-west through the provinces of New Castile and Estremadura, and passing by the cities of Aranjuez, Toledo, and Alcantara, and then crossing Portugal, forms the harbour of Lisbon, at which city it is about three miles over ; and about 8 or 10 miles below this, it falls into the Atlantic ocean.

TAJACU, the **MUSK-HOG**, in zoology, a species of hog, with a cyst on the back, and no tail : it is a native of Mexico, and is smaller than the common hog. On the middle of the head there arises a kind of crest, composed of a large cluster of bristles ; and on the middle of the back there is a kind of cyst or gland, with an opening at the upper part, in which is secreted a perfumed fluid matter, of a mixt smell between that of musk and civet ; whence the english name.

TAIL, *cauda*, the train of a beast, bird, or fish ; which, in land animals, serves to drive away flies, &c. and in birds and fishes, to direct their course, and assist them in ascending or descending in the air or water. See the articles **QUADRUPED**, **BIRD**, **FISH**, &c.

TAIL of a comet, denotes the luminous rays issuing from a comet towards that part of the heavens, from whence it seems to move. See the article **COMET**.

TAIL of the trenches, in the art of war, is the post or place, where the besiegers begin to break ground. See **TRENCHES**.

Dragon's TAIL, in astronomy, the descending node of a planet. See **NODE**.

Horse's TAIL, in the customs of the eastern nations, is the ensign, or flag, under which they make war.

TAIL, or **FEE-TAIL**, in law, is a limited estate, or fee ; opposed to fee-simple. See the article **FEE**.

Fee-tail is an inheritance whereof a person is seised, to him and the heirs of his body, begotten or to be begotten ; so that the tenant in tail cannot alien, either before or after issue had, or forfeit such lands, longer than for his own life ; because an estate in tail always remains to the issue of the donee and his heirs ; or in case he has no issue, then to the donor and his heirs.

Estates-tail of lands are either general or special. General tail is where lands or tenements are given to a man, or woman, and the heirs of either of their bodies begotten ;



Fig. 1. TAGE TES.



Fig. 2 . TANGENT .

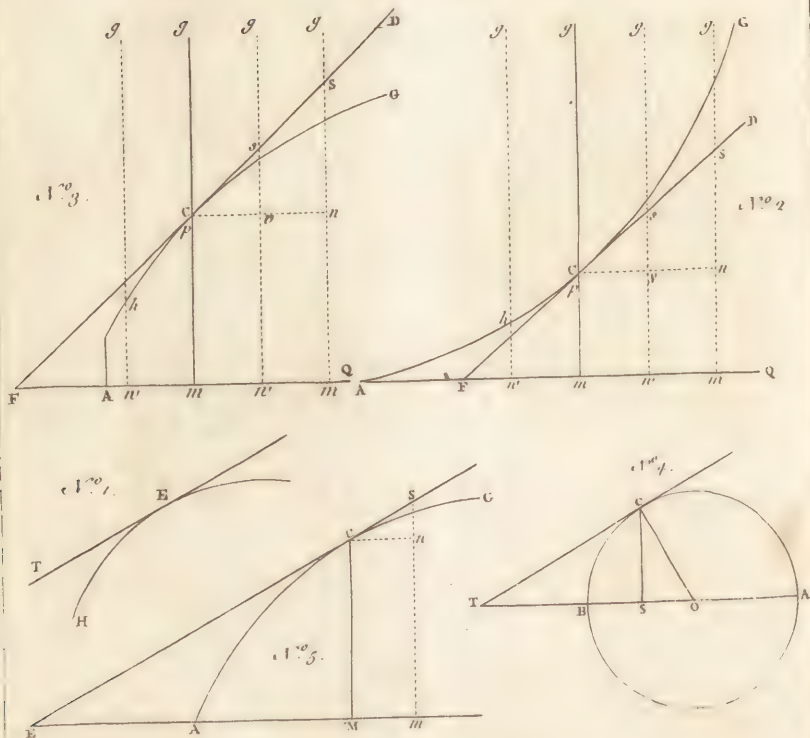
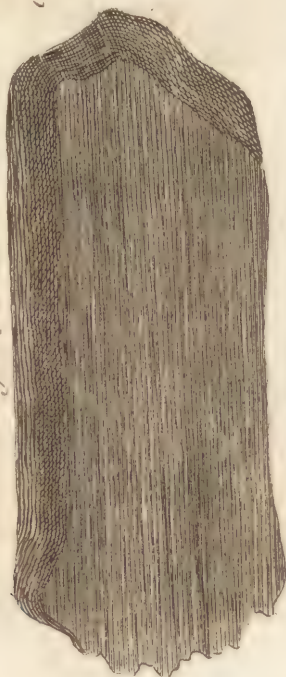


Fig. 3. TANACETUM the TANZY.





Fig. 2. Hyalina



TALCS.

Order 1.

Fig. 1. Specularis



Order 2.

Fig. 4. Bractearium

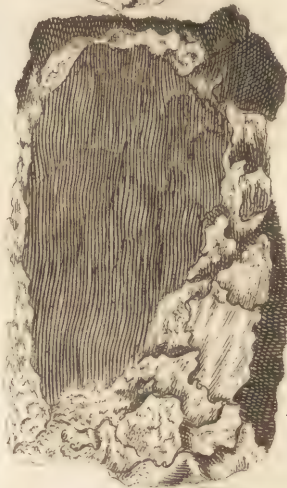


Fig. 3. Bractearium

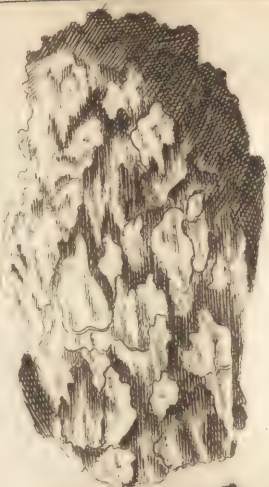


Fig. 6. Elasmis

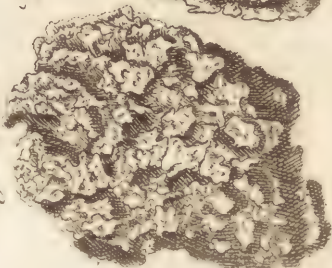
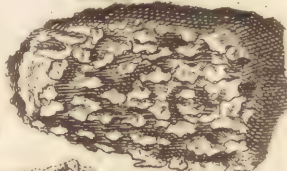


Fig. 5. Elasmis



begotten; which is called a general tail, because, however many wives a person that holds by this title shall have one after another in lawful marriage, his issue by them severally are all capable of inheriting in their turns: and if the woman has issue by several husbands, they may all inherit after each other, as heirs of her body. A tail-special, on the other hand, is when lands, &c. are limited to a man and his wife, and the heirs of their two bodies begotten, so that the children by a second wife, or former wife, stand absolutely excluded.

Where lands are granted to a man and his heirs-male, or heirs female of his body begotten, such male or female issue shall only inherit pursuant to the limitation: and hence it is, that where a grant is to a man and the heirs-male of his body begotten, and he has issue a daughter, who has a son, this son cannot inherit the estate, because he cannot prove his descent by heirs-male.

Where lands, &c. are given to a husband and wife, and the heirs of their two bodies begotten in special tail, and one of them dies without issue had between them; in such case, the survivor shall hold the lands for life, as tenant in tail after possibility of issue extinct, as the lawyers call it.

Nevertheless, as great mischiefs were occasioned by inheritances being intailed; as defrauding of creditors, &c. disobedience of sons, when they knew they could not be disinherited, and the like, the judges found out a way to bar an intailed estate with remainders over, by a feigned recovery. See RECOVERY.

TAILLEBOURG, a town of Guienne, in France, thirty miles south-east of Rochelle.

TALLOIR, in architecture, a term sometimes used for abacus. See ABACUS.

TAINE, a port-town of Ross shire, in Scotland, situated on the south-side of the frith of Sutherland, seven miles north of Cromartie: west long. $3^{\circ} 38'$, north lat. 58° .

TAINT, in law, signifies either a conviction; or the person convicted, of some treason, felony, &c. See the article TREASON and FELONY.

TAITCHEU, a city and port-town of China, situated on the coast of the Pacific Ocean, in east long. 121° , north lat. 29° .

TALAMONE, a port-town of Tuscany, fifteen miles north of Orbitello.

TALavera, a town of Estremadura, in Spain, fourteen miles east of Badajoz.

TALC, or **TALK**, in natural history, a large class of fossil bodies, composed of broad, flat, and smooth laminæ or plates, laid evenly and regularly on one another; easily fissile, according to the site of these plates, but not all so in any other direction; flexible and elastic; bright, shining, and transparent; not giving fire with steel, nor fermenting with acid menstrua, and sustaining the force of a violent fire without calcining.

Talcs are divided into two orders; the first of which are composed of plates of great extent, each making singly the whole horizontal surface of the mass.

The genera of the first order are two: the first is of those composed of visibly separate plates of extreme thinness; and each fissile again into a number of others yet finer: the talcs of this genus are called speculars. See plate CCLXVII. fig. 1.

The second genus is of those which are composed of separate plates of considerable thickness, and those not fissile into any thinner. The talcs of this genus are called hyalinæ, *ibid.* fig. 2.

The talcs of the second order are those composed of small plates, in form of spangles, irregularly disposed, and usually many of them concurring in different directions, to the formation of one of the surfaces of the mass.

The genera of the second order are also two: the first is of those composed of small plates, in form of spangles, each fissile into many yet finer and thinner ones: the talcs of this genus are called bractearia. *ibid.* fig. 3, and 4.

The second genus is of those composed of small plates in form of spangles, which are moderately thick, and are either not fissile at all, or are only so to a certain degree, or into a small number of others yet thick ones, and those no farther fissile: the talcs of this last genus are called elastides. *ibid.* fig. 5, and 6.

Talcs, though of no manner of use in medicine, are nevertheless used in many arts and manufactures; for a farther account of which, see SPECULARIS, &c.

Philosophic TALC, an appellation given by some to the flowers of zink. See ZINK.

TALent, money of account amongst the antients. See the articles COIN and MONEY.

Amongst the Jews, a talent in weight was equal to 60 maneh, or 113 lb. 10 oz. 1 dwt. $10 \frac{2}{3}$ gr.

TALES, in law, a word used for a supply of men impanelled on a jury, and not appearing; or upon appearance, being challenged for the plaintiff or defendant, as not indifferent; in which case the judge, upon motion, of course grants a supply to be made by the sheriff, of some persons there present, equal in reputation to those that are impanelled. Where a person has had one tales, he may have another, but not have the latter to contain so many as the former, because the first tales must be under the number of the principal panel, except in the case of appeal; and in like manner every tales is to be less than other, until the whole number be made use of, are persons without exception. There are two kinds of tales, the one *de circumstantibus*, and the other a *decem tales*: that of *circumstantibus*, is, when a full jury does not appear at the *nisi prius*, or so many are challenged as not to have a full jury; on which motion being made, the judge will grant this tales, which the sheriff immediately returns into court. A *decem tales* is when a full jury does not appear at a trial at bar, in which case this writ goes out to the sheriff, commanding him to *apponere decem tales*.

TALIO, *lex talionis*, a species of punishment in the mosaic law, whereby an evil is returned similar to that committed against us by another; hence that expression, eye for eye, tooth for tooth. This law was at first inserted in the twelve tables amongst the Romans, but afterwards set aside, and a power given to the prætor to fix upon a sum of money for the damage done.

TALISMANS, magical figures cut or engraved with superstitious observations on the characteristics and configurations of the heavens, to which some astrologers have attributed wonderful virtues, particularly that of calling down celestial influences. The talismans of Samothrace, so famous of old, were pieces of iron formed into certain images, and set in rings; these were esteemed preservatives against all kinds of evils. There were likewise talismans taken from vegetables, and others from minerals. There is a general division of talismans into three kinds. 1. Astronomical, which are known by the signs or constellations of the heavens engraven thereon, with other figures, and some unintelligible characters. 2. Magical, which bear very extraordinary figures, with superstitious

words, and names of angels unheard of. 3. Mixt, which consist of signs and barbarous names, but without superstitious ones, or names of angels unknown. There have been some rabbins who maintained, that the brazen serpent raised by Moses, was a talisman.

TALK, or **TALC**, in natural history. See the article **TALC**.

TALLAGE, in law-books, is a general name for all taxes: hence, *tallagium facere*, is to give up accounts into the exchequer, where the method of accounting is by tallies. See **TALLY**.

TALLARD, a town of Dauphine, in France, situated on the river Durance, forty-seven miles south of Grenoble.

TALLEMONT, a town of Guienne, in France, situated near the mouth of the river Garonne, forty miles south of Rochelle.

TALLOW, in commerce, the fat of certain animals, melted down and clarified, so as to be fit for making candles, &c. See the article **CANDLE**.

Tallow, imported from abroad, pays for every hundred weight, a duty of 7s. 10⁷/₈ d. and draws back, on being exported again 7s. 6 d.

TALLOW-TREE, a remarkable tree growing in great plenty in China; so called, from its producing a substance like tallow, which serves for the same purpose: it is about the height of a cherry-tree, its leaves in form of a heart, of a deep shining red colour, and its bark very smooth. Its fruit is inclosed in a kind of pod, or cover like a chestnut, and consists of three round white grains, of the size and form of a small nut, each having its peculiar capsula, and within a little stone. This stone is encompassed by a white pulp which has all the properties of true tallow, both as to consistence, colour, and even smell; and accordingly the Chinese make their candles of it; which would doubtless be as good as those in Europe, if they knew how to purify their vegetable, as well as we do our animal, tallow.

All the preparation they give it, is to melt it down and mix a little oil with it, to make it softer and more pliant. It is true their candles made of it yield a thicker smoke, and a dimmer light, than ours; but those defects are owing in a great measure to the wicks, which are not of cotton, but only a little rod, of dry light wood covered with the pith of a rush wound round it; which, being

very

very porous, serves to filtrate the minute parts of the tallow, attracted by the burning stick, which by this means is kept alive.

TALLY, in law, a piece of wood cut in two parts, whereon accounts were anciently kept, by means of notches; one part of the tally being kept by the debtor, and the other by the creditor.

As to the tallies of loans, one part thereof is kept in the exchequer, and the other part given to particular persons in lieu of an obligation for the monies they have lent to the government on acts of parliament. This last part is called the stock, and the former the counter stock, or counter tail.

Tallies of debt, are a kind of acquittance for debt paid to the king, upon the payment of which every debtor receives one of these tallies; and on carrying the same to the clerk of the pipe-office, has an acquittance there given him, on parchment, for his full discharge.

Tallies of reward, were an allowance made to sheriffs for such sums as they have cast upon them in their accounts, but cannot levy.

TALMUD, or **THALMUD**, among the Jews, a collection of the doctrines of their religion and morality. It is the *corpus juris*, or body of the laws and customs of the Jews, who esteem it equal to the scriptures themselves. See **CARAITES**, **RABBI**, **GEMARA**, &c.

TALON, in architecture, a kind of moulding, which consists of a cymatium, crowned with a square fillet; frequently found to terminate joiners-work, as those of doors, windows, &c.

TALPA, the **MOLE**, in zoology. See the article **MOLE**.

TALPA, in surgery, a name given to encysted tumours, when situated under the scalp.

TALUS, in anatomy, the same with the astragalus. See **ASTRAGALUS**.

TALUS, or **TALUT**, in architecture, the inclination or slope of a work; as of the outside of a wall, when its thickness is diminished by degrees, as it rises in height to make it the firmer.

TALUS, in fortification. Talus of a bastion, or rampart, is the slope or diminution allowed to such a work, whether it be of earth or stone, the better to support its weight.

The exterior talus of a work, is its slope on the side towards the country; which is always made as little as possible,

to prevent the enemies scalado; unless the earth be bad, and then it is absolutely necessary to allow a considerable talus for its parapet. The interior talus of a work is its slope on the inside towards the place.

TAMANDUA, in zoology, the same with the myrmecophaga. See the article **MYRMECOPHAGA**.

TAMAR, a river, which divides Devonshire from Cornwall, running from north to south.

TAMARIND, *tamarindus*, in botany, a genus of the triandria-monogynia class of plants, the flower of which consists of three or four ovated and equal petals; and its fruit is a long compressed pod, containing three angulated and compressed seeds.

The pod is made up of a double rind, or membrane, between which is a pulpy matter; which taken in the quantity of two or three drams, or an ounce or more, proves gently laxative or purgative; and at the same time, by its acidity, quenches thirst, and allays immoderate heat. It increases the action of the purgative sweets, cassia and manna, but weakens that of the resinous cathartics: some have supposed it capable of abating the virulence of antimonial preparations; but experience shews, that it has a contrary effect, and that all vegetable acids augment their power: it is also recommended in diarrhoeas, and nephritic complaints, and is said to cure the jaundice without the assistance of any other medicine.

TAMARISK, *tamariscus*, or *tamarix*, a genus of trees belonging to the pentandria-trigynia class of plants; its flower is rosaceous, and consists of five ovated, concave and obtuse, patent petals: the fruit is an oblong and triquetrous capsule, containing a great many very small and pappose seeds.

The bark and leaves of the tamarisk-tree are moderately astringent, but never prescribed in the present practice.

TAMBAC, a mixture of gold and copper, which the people of Siam hold more beautiful, and set a great value on, than gold itself.

TAMBOUR, in architecture, a term applied to the corinthian and composite capitals, as bearing some resemblance to a drum, which the french call tambour.

TAMBOUR is also used for a little box of timber-work covered with a ceiling, within-side the porch of certain churches,

both to prevent the view of persons passing by, and to keep off the wind, &c. by means of folding doors.

TAMBOUR also denotes a round course of stone, several whereof form the shaft of a column, not so high as a diameter.

TAME, a market town of Oxfordshire, situated on the river Tame, ten miles east of Oxford.

TAMNUS, or **TAMUS**, **BLACK BRYONY**, in botany, a genus of the dioecia-hexandria class of plants, without any corolla; the calyx is divided into six parts; the fruit is a trilocular berry, situated below the calyx, and containing two seeds in each cell.

The root of this plant is said to be somewhat poisonous, whence it frequently proves of bad consequence, when administered instead of the white bryony.

TAMOATA, in ichthyology, the name by which some call the callichthys or stromateus. See **STROMATEUS**.

TAMPION, or **TOMPION**, among gunners, a plug to stop the mouths of cannons, mortars, &c. to keep them clean within.

TAMUS, or **TAMNUS**. See **TAMNUS**.

TAMWORTH, a borough of Staffordshire, situated twenty-miles south-east of Stafford.

It sends two members to parliament.

TAN, the bark of the oak, chopped and ground, in a tanning-mill, into a coarse powder, to be used in the tanning of leather. See the article **TANNING**.

New tan is the most esteemed; for when old and stale it loses a great deal of its effects, which consists in condensing and closing the pores of the skin, so that the longer the skins are kept in tan, the greater strength and firmness they acquire. In effect, not only the bark, but every part of the oak-tree, of what age and growth soever, and all oaken coppice, &c. cut in barking-time, make good tan, as good at least as the best bark. This when got, is to be well dried in the sun, houted dry, and kept so. When it is to be used, the greater wood must be shaved small, or cut for the tan engine, and the smaller bruised, or cut small by the engine, after which it must be dried on a kiln, &c. See the article **TANNING ENGINES**.

For the use of tan in gardening, see the article **STOVES**.

TANACETUM, in botany, a genus of the syngenesia-polygamia æqualis class of plants, with a compound, tubulose and

convex flower, the lesser corollulæ of which are funnel-fashioned, and quinquid at the limb: a single seed succeeds each lesser flower, and is contained in the cup. See plate **CCLXVIII.** fig. 3.

This genus comprehends the common tanzy, costmary, &c. Tanzy, considered as a medicine, is a moderately warm bitter, and is much extolled by some in hysteric complaints, especially if proceeding from a deficiency or suppression of the uterine purgations: its seeds and leaves have been in considerable esteem as anthelmintics; and are said to be good in colics and flatulencies.

TANAIS, or **DON RIVER**. See **DON**.

TANARO, a river of Italy, which rising in the south of Piedmont, runs north-east by Asti and Alexandria, and falls into the Po below Valenza.

TANASSERIM, a city of the further India, and capital of a province of the same name, in the kingdom of Siam: east long. 98°, north lat. 12°.

TANCOS, a town of Estremadura, in Portugal, situated on the river Tagus, sixty miles north-east of Lisbon.

TANDA, a town situated on the east-side of the Ganges, in the province of Bengal: east long. 87°, north lat. 25°.

TANDAYA, one of the most easterly of the Philippine islands, situated in east long. 124°, and north lat. 12°, subject to the king of Spain.

TANGENT, in geometry, is defined, in general, to be a right-line, **ET** (plate **CCLXVIII.** fig. 2. n° 1.) which touches any arch of a curve, **HE** in **E**, in such a manner that no right line can be drawn through **E** betwixt the right-line **ET** and the arch **EH**, or within the angle **HET** that is formed by them.

The tangent of an arch is a right-line drawn perpendicularly from the end of a diameter, passing to one extremity of the arch, and terminated by a right-line drawn from the center through the other end of the arch, and called the secant. See **SECANT** and **SINE**.

And the co-tangent of an arch, is the tangent of the complement of that arch. See **ARCH** and **COMPLEMENT**.

The tangent of a curve is a right-line which only touches the curve in one point, but does not cut it.

In order to illustrate the method of drawing tangents to curves, let **ACG** (*ibid.* n° 2.) be a curve of any kind, and **C** the given point from whence the tangent is to be drawn. Then conceive a right-line,

line, mg , to be carried along uniformly, parallel to itself, from A towards Q ; and let, at the same time, a point p so move in that line, as to describe the given curve ACG : also let mm , or Cn , express the fluxion of Am , or the velocity where-with the line mg is carried; and let nS express the corresponding fluxion of mp , in the position mCg , or the velocity of the point p , in the line mg : moreover, through the point C let the right-line SF be drawn, meeting the axis of the curve, AQ , in F .

Now it is evident, if the motion of p , along the line mg , was to become equable at C , the point p would be at S , when the line itself had got into the position mSg ; because, by the hypothesis, Cn and nS expresses the distances that might be described by the two uniform motions in the same time. And if ws be assumed to represent any other position of that line, and s the contemporary position of the point p , (still supposing an equable velocity of p ; then the distances Cw , and ws , gone over in the same time by the two motions, will always be to each other as the velocities, or as Cn to nS . Therefore, since $Cw : ws :: Cn : nS$ (which is a known property of similar triangles) the point s will always fall in the right-line FCs : *ib. n° 3*, whence it appears, that if the motion of the point p along the line mg was to become uniform at C , that point would then move in the right-line CS , instead of the curve-line CG . Now, seeing the motion of p , in the description of curves, must either be an accelerated or retarded one; let it be first considered as an accelerated one, in which case the arch CG will fall wholly above the right-line CD , as in *n° 2*. because the distance of the point p from the axis AQ , at the end of any given time, is greater than it would be if the acceleration was to cease at C ; and if the acceleration had ceased at C , the point p would have been always found in the said right-line FS . But if the motion of the point p be a retarded one, it will appear, by arguing in the same manner, that the arch CG will fall wholly below the right-line CD , as in *n° 3*.

This being the case, let the line mg , and the point p , along that line, be now supposed to move back again, towards A and m , in the same manner they proceeded from thence: then, since the velocity of p (*ibid. n° 2.*) did before in-

crease, it must now, on the contrary, decrease; and therefore as p , at the end of a given time, after repassing the point C , is not so near to AQ , as it would have been had the velocity continued the same as at C , the arch Cb (as well as CG) must fall wholly above the right-line FCD : and by the same method of arguing, the arch Cb , in the second case, will fall wholly below FCD . Therefore FCD , in both cases, is a tangent to the curve at the point C : whence the triangles FmC and CnS being similar, it appears that the sub-tangent mF is always a fourth proportional to nS the fluxion of the ordinate Cn , the fluxion of the absciss, and Cm the ordinate; that is $Sn : nC :: mC : mF$. Hence, if the absciss $Am = x$, and the ordinate $mp = y$,

we shall have $mF = \frac{yx}{\dot{y}}$; by means of

which general expression, and the equation expressing the relation between x and y , the ratio of the fluxions \dot{x} and \dot{y} will be found, and from thence the length of the subtangent mF , as in the following examples.

Example I. To draw a right-line CT (*ibid. n° 4.*) a tangent to a given circle BCA , in a given point C . Let CS be perpendicular to the diameter AB , and put $AB = a$, $BS = x$, and $SC = y$. Then by the property of the circle, $y^2 (=CS^2) = BS \times AS (=x \times a - x) = ax - x^2$; whereof the fluxion being taken, in order to determine the ratio of \dot{x} and \dot{y} , we get $2y\dot{y} = a\dot{x} - 2x\dot{x}$; consequently $\frac{x}{y} = \frac{2y}{a - 2x} = \frac{y}{\frac{1}{2}a - x}$; which

multiplied by y , gives $\frac{yx}{y} = \frac{y^2}{\frac{1}{2}a - x} =$ the

subtangent ST . Whence, O being supposed the center, we have $OS (= \frac{1}{2}a - x) : CS (=y) :: CS (=y) : ST$; which is also found to be the case from other principles. See the article CIRCLE.

Example II. To draw a tangent to any given point C (*ibid. n° 5.*) of the conical parabola ACG . If the latus rectum of the curve be denoted by a , the ordinate MC by y , and its corresponding absciss AM by x ; then the known equation, expressing the relation of x and y , being $ax = y^2$, we have, in this case, the fluxion

$a\dot{x} = 2y\dot{y}$; whence $\frac{\dot{x}}{\dot{y}} = \frac{2y}{a}$, and con-

sequently $\frac{yx}{y} = \frac{2y^2}{a} = \frac{2ax}{a} = 2x = MF$.

There-

Therefore the subtangent is just the double of its corresponding absciss A M. And so for finding the tangents of other species of curves. See the articles CURVE, PARABOLA, ELLIPSIS, &c.

TANGERE, or **NOLI METANGERE**. See the article **NOLI**.

TANGERMUNDE, a town of Germany, in the circle of Upper Saxony, and marquisate of Brandenburg, situated on the river Elbe, fifty-four miles west of Berlin.

TANGIER, a port town of Africa, in the empire of Morocco and kingdom of Fez, situated at the entrance of the straits of Gibraltar, in west long. 7° , north lat. $35^{\circ} 40'$. It was the capital of the antient Mauritania Tingitana, and was once in the possession of the English.

TANGUT, a province of chineſian Tartary, situated north-west of the great wall which divides Tartary from China.

TANJOUR, a city of the hither India, capital of a province of the same name, situated east long. 79° , north lat. $11^{\circ} 30'$.

TANNER, one who dresses hides, &c. by tanning them. See the next article.

TANNING, the preparing of skins or hides in a pit, with tan and water, after the hair has been first taken off, by putting the skins into lime-water. See the articles **SKIN**, **HIDE**, &c.

Method of TANNING oxen-hides. The skin being flayed off the carcase, if it is intended to be kept, is salted with sea-salt and alum, or with a coarse kind of saltpetre. If it is not for keeping, the salting is saved, as being of no use but to prevent the hide from corrupting before it can be conveniently carried to the tan-house. Whether the hide have been salted or not, the tanner begins with taking off the horns, the ears, and the tail, after which it is thrown into a running water for about thirty hours, to wash off the blood and other impurities adhering to the inside. This done, it is laid over night in a lime-pit, already used, whence it is taken and left to drain three or four days on the edge of the pit. The first and slightest preparation over, it is retained into a strong lime-pit for two days, then taken out for four days more; and thus for six weeks alternately, it is taken out and put in twice a week. At the six weeks end it is put into a fresh pit, where it continues eight days, and is then taken out for so many, and thus alternately for a year or eighteen months, according to the strength of the leather and

the weather; for in great heats they put in fresh lime twice a week; and in frost they sometimes do not touch them for three months. Every fresh lime-pit they throw them into, is stronger and stronger. At the end of four, five, or six weeks, the tanner scrapes off the hair on a wooden leg or horse, with a kind of knife made for that purpose. And after a year or eighteen months, when the hair is perfectly gone, he carries it to a river to wash, pares off the flesh on the leg with a kind of cutting knife, and rubs it briskly with a sort of whetstone, to take off any remains of flesh or of filth on the side of the hair. The skin is now put into tan, that is, it is covered with tan as it is stretched in the pit, and water is let in upon it; if the skin is strong, five coverings of tan will be required; for weaker, three or four may suffice. When the skin has not been kept long enough in lime, or in the tan-pit, upon cutting it in the middle there appears a whitish streak, called the horn or crudity of the skin, and it is this crudity that is the reason why the soles of shoes, boots, &c. stretch so easily and take water. When the hides are sufficiently tanned, they are taken out of the pit to be dried, by hanging them in the air; then the tan is cleared off them, and they are put into a place neither too dry nor too moist; they are there well stretched over one another with weights a-top, to keep them tight and strait; and in this condition are sold under the denomination of bend-leather. This is the method of tanning bullocks or oxen-hides. Cows, calves, and horses skins are tanned much after the same manner of those of oxen, except that they are only kept four months in the lime pit, and that before they be put in the tan, there is a preparation required thus: cold water is poured into a wooden vat, or tub, wherein the skins are put, which are kept stirring while some other water is warming in a kettle; and as soon as that water is little more than luke-warm, it is poured gently into the vat, and upon this is cast a basket of tan; during which time the skins are still kept turning, that the water and tan may not scorch them. After an hour they are taken out and cast for a day into cold water, then returned to the former vat and the same water they had been in before, and here they are left for eight days: which expired, they are put into the tan-pit, and three coverings of tan given them; the first of which lasts five weeks,



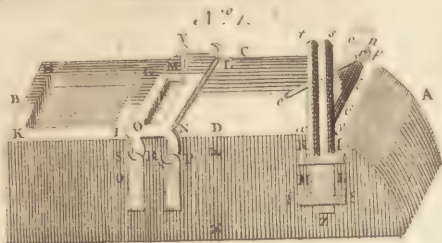


Fig. 1. TANNING-ENGINE
and MILL.

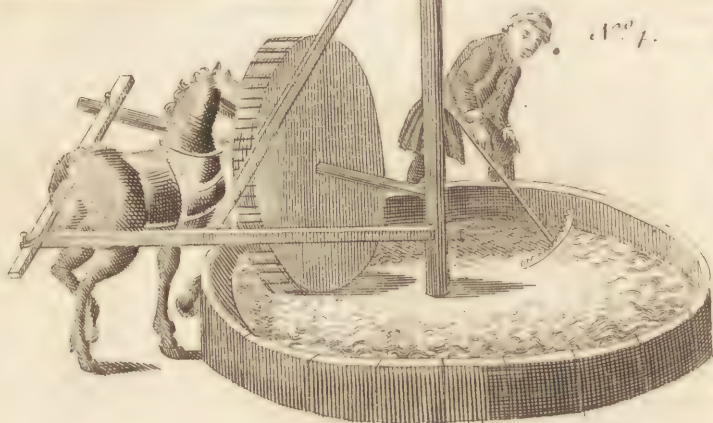
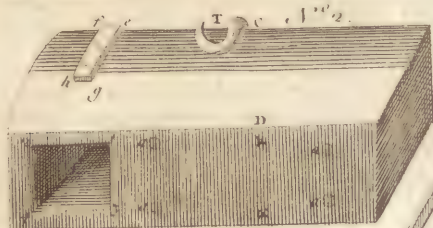
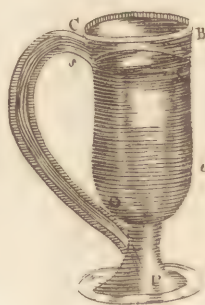
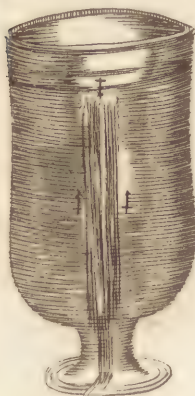


Fig. 2. TANTALUS'S CUP.



weeks, the second six, and the third two months. The rest of the process is the same in all respects as that delivered above. See the articles TAN, LEATHER, and the next article.

TANNING ENGINES, machines used by tanners for beating, cutting, and grinding tan, or the materials used in tanning. See TAN, and the preceding article.

The machine for cutting tan, as represented in plate CCLXIX. fig. 1. n° 1, 2. consists of a long square wooden block, which is best of oak or elm; and of some pieces of iron to be fastened on it, and used about it, *viz.* an anvil, a hammer, an iron holding the wood to be bruised and cut, and a knife. AB, n° 1. is the length of the block, being about four feet; CD the breadth, which is fifteen or sixteen inches; EF the depth, eight or ten inches; GHIK a square cavity to receive a plate of iron, serving for an anvil to beat and bruise the tanning materials upon; this is to be about four inches deep, nine inches broad, and twelve inches long; LMNO the iron for clasp- ing and holding fast the materials to be bruised and cut, which must lie cross the engine, about the middle of the said piece of timber, and may be about three inches broad; PQ are two hooks at one end of it, which are turned upwards, and must be hooked into the loops of the two hinges that are let in and fastened to the sides of the engine RS, in such a manner that this clasp- ing piece may be a little raised for putting the tanning materials under it. At the side T, (*ibid.* n° 2.) is a single hook turned also upwards, to hang a weight upon it, whilst the stuff is a bruising by the anvil, or a cutting by the knife. The button in n° 1. serves to take up this piece by; *aaaa* on the other side of the block, n° 2. are the places for the four feet of the engine, which are to be of a convenient height to work upon it. *b* (*ibid.* n° 3.) is the hammer for beating and bruising the stuff, which may be of six pounds weight, and the head about three inches square, to work with both hands; but for one hand, it may be made of three pounds weight, and the head about two inches square; the surface of one end of these hammers should be smooth, but that of the other indented, *c* d, n° 1. the knife for cutting the bruised stuff, which must be eight or nine inches long, and near as much in breadth, made like a tobacco-knife, with a handle, and

fastened to the block at the two opposite sides, that are to be hollowed, with two grooves, *efgh*, n° 2. and *iklm*, n° 1. with two pieces of iron fitted in the grooves, to hold and guide the knife in cutting. *nopq*, n° 1. is to be fastened to the end of the knife *c*, by a pin *r*, passing through three holes; and this end is to be screwed into the groove *efgh*, n° 2. by a couple of screw-pins; the other piece, *stuxyz*, n° 1. being forked in, is to receive the other end of the knife *d*, and the solid square part thereof, IKLM, is to be fastened in the groove under it by two iron-plates *aaes*, under which it must run in the said groove so as to be slipped out from under it, and laid by when the machine is not used, when also the piece at the other end may be unscrewed and laid up. The long squares upon one end of the block, *viz.* 3, 6, 7, 8, n° 1. are two iron plates, to be fastened where the knife, moving in a fit cavity, is to cut the bruised stuff between them; and of these plates that which lies next the end is to be laid a little lower, the block being there pared accordingly, that so the stuff may fall off from the end of the machine the quicker, as the left-hand supplies the bruised materials, whilst the right-hand cuts them. Let the hollow place where the knife cuts be as near as possible, only large enough for the knife to rise and fall easily; and let the block be hollowed under the cutting-hole, and sloped off at that end, for the stuff to fall off, as it is cut by the knife.

The stuff being cut small by the engine, is to be well dried again on a kiln, and then ground into a coarse powder upon the mill, being a large round wooden trough, with a pretty large stone set on edge in it, and turned round by a horse, as represented *ibid.* n° 4.

TANT, or the LITTLE SCARLET-SPIDER, in the history of insects, the red land acarus, with a depressed body. See the article ACARUS.

This is a small species, its body is roundish but a little approaching to oval; the back somewhat depressed; it is of a fine scarlet colour, and covered with a velvety down.

TANTALUS'S CUP, in hydraulics, a siphon so adapted to a cup, that the short leg being in the cup, the long leg may go down through the bottom of the cup. See the article SIPHON.

This bended siphon is called Tantalus's cup,

cup, from the resemblance of the experiment made with an image in the glass, representing Tantalus in the fable, fixed up in the middle of the cup with a siphon concealed in his body, beginning in the bottom of his feet, and ascending to the upper part of his breast; there it makes a turn, and descends through the other leg, on which he stands; and from thence down through the bottom of the cup, where it runs out, and causes the water to subside in the cup: as soon as it rises to the height of the siphon, or to the chin of the image, which is above *Ss*, plate CCLXIX. fig. 2. n° 1. the water will begin to run through the siphon concealed in the figure, till the cup is emptied in the manner explained under siphon, and represented more distinctly in *ibid.* n° 2.

Sometimes the Tantalus's cup is made without a figure fixed in it, as *ibid.* no 3. where the water being up at *Ss*, the cup does not run; but as soon as the figure, or an apple, or orange, &c. is thrown in, the water begins to run out at the foot of the cup, and does not cease till the whole cup is empty. This happens because the body thrown into the cup, raises the water's surface from *Ss* to *BC*, where being above the upper end *S* of the pipe *SP* concealed in the handle, which thereby is made a siphon, the water, which is come into the handle at *O*, runs into the middle pipe at *s*, and so out at *P*, under the foot, so long as there is any water above *O*.

TANTAMOUNT, something that amounts, or is equivalent, to some other.

TANTUM DECIES. See the article DECIES TANTUM.

TANZY, *tanacetum*, in botany. See the article TANACETUM.

TAORMINA, a port-town of Sicily, situated in the province of Demona, eighteen miles south of Messina.

TAP, among hunters, an hare is said to tap or beat, when she makes a particular noise at rutting-time.

TAP ROOT, among gardeners, that part of the root that descends straight down.

TAPASSANT, among hunters, denotes lurking or squatting.

TAPE WORM, in the history of insects, the flat *tænia*, frequently growing to the length of several ells. See *TÆNIA*.

This creature is found in the human intestines, and in those of many other animals, as well fish as quadrupeds.

TAPER, **TAPERING**, is understood of a

piece of timber, or the like, when broad at one end and gradually diminishing to the other, as is the case in pyramids, cones, &c.

TAPER BOARD, is applied to a piece of ordnance when it is wider at the mouth than towards the breech.

TAPER also denotes a kind of tall wax-candle placed in a candlestick, and burnt at funeral processions, and in other church-solemnities. Tapers are made of different sizes; in some places, as Italy, &c. they are cylindrical, but in most other countries, as England, France, &c. they are conical or taper; both kinds are pierced at the bottom for a kind of pin in the candlestick to enter. For the method of making tapers, both by the ladle and by the hand, see the articles *CANDLE* and *FLAMBEAU*.

Paschal TAPER, among the romanists, a large taper whereon the deacon applies five bits of frankincense in holes made for the purpose in form of a cross, and which he lights with new fire in the ceremony of Easter-Sunday.

TAPESTRY, or **TAPISTRY**, a curious kind of manufacture, serving to adorn a chamber or other apartment, by covering or lining the walls thereof. It is a kind of woven hangings of wool and silk, frequently raised and enriched with gold and silver, representing figures of men, animals, landscapes, histories, &c.

The invention of tapestry seems to have come to us from the Levant; and this seems the more probable, in that the workmen concerned in it were called, at least in France, *sarrasins*, or *sarrasinois*. It is supposed that the English and Flemish, who were the first that excelled in making tapestry, might bring the art with them from some of the croisades, or expeditions against the Saracens. Be this as it will, it is certain that these two nations, especially the English, were the first who set on foot this noble and rich manufacture in Europe, now one of the finest ornaments of palaces, churches, &c. and therefore if they may not be allowed the inventors, they have at least the glory of being the restorers of this so curious and admirable an art, as gives a kind of life to wools and silks, in no respect inferior to the paintings of the best masters.

Tapestry-work is distinguished by the workmen into two kinds, *viz.* that of high, and that of low warp; though the difference is rather in the manner of working

ing than in the work itself; which is in effect the same in both; only the looms, and consequently the warps, are differently situated. Those of the low warp being placed flat and parallel to the horizon, and those, on the contrary, of the high warp erected perpendicularly. The English antiently excelled all the world in the tapestry of the high warp, and they still retain their former reputation, though with some little change: their low warps are still admired; but, as for the high ones, they are quite laid aside by the French. The French have three considerable tapestry-manufactures besides that of the Gobelins; the first at Aubusson in Auvergne, the second is at Felletin in the Upper Marche, and the third at Beauvais. They were all equally established for the high and the low warp; but they have all laid aside the high warp, excepting the Gobelins. There are admirable low warps in Flanders, generally exceeding those of France; the chief and almost only Flemish manufactures are at Brussels, Antwerp, Oudenard, Lille, Tournay, Bruges, and Valenciennes.

The usual widths of tapestries are from two ells to three ells Paris-measure.

The manufacture of TAPESTRY of the high warp. The loom, whereon it is wrought, is placed perpendicularly: it consists of four principal pieces; two long planks or cheeks of wood, and two thick rollers or beams. The planks are set upright, and the beams across them, one at the top, and the other at the bottom, or about a foot distance from the ground. They have each their trunnions, by which they are suspended on the planks, and are turned with bars. In each roller is a groove from one end to the other, capable of containing a long round piece of wood, fastened therein with hooks. The use of it is to tie the ends of the warp to. The warp, which is a kind of worsted, or twisted woollen thread, is wound on the upper roller; and the work, as fast as wove, is wound on the lower. Withinside the planks, which are seven or eight feet high, fourteen or fifteen inches broad, and three or four thick, are holes pierced from top to bottom, in which are put thick pieces of iron, with hooks at one end, serving to sustain the coat-stave: these pieces of iron have also holes pierced, by putting a pin in which, the stave is drawn nearer or set further off; and thus the coats or threads are stretched or

loosened at pleasure. The coat-stave is about three inches diameter, and runs all the length of the loom; on this are fixed the coats or threads, which make the threads of the warp cross each other. It has much the same effect here, as the spring-stave and treddles have in the common looms. The coats are little threads fastened to each thread of the warp with a kind of sliding knot, which forms a sort of mash or ring. They serve to keep the warp open for the passage of broaches wound with silks, woollens, or other matters used in the piece of tapestry. In the last place, there are a number of little sticks of different lengths, but all about an inch in diameter, which the workman keeps by him in baskets, to serve to make the threads of the warp cross each other, by passing them across; and, that the threads thus crossed may retain their proper situation, a packthread is run among the threads, above the stick.

The loom being thus formed, and mounted with its warp, the first thing the workman does, is to draw on the threads of this warp, the principal lines and strokes of the design to be represented on the piece of tapestry; which is done by applying cartoons, made from the painting he intends to copy, to the side that is to be the wrong side of the piece, and then, with a black-lead pencil, following and tracing out the contours thereof on the thread of the right side; so that the strokes appear equally both before and behind.

As for the original design the work is to be finished by, it is hung up behind the workmen, and wound on a long staff from which a piece is unrolled from time to time, as the work proceeds.

Besides the loom, &c. here described, there are three other principal instruments required for working the silk or the wool of the wool within the threads of the warp; these are a broach, a reed, and an iron-needle.

The broach is made of a hard wood, seven or eight inches long, and two thirds of an inch thick, ending in a point with a little handle. This serves as a shuttle; the silks, woollens, gold, or silver to be used in the work, being wound on it.

The reed or comb is also of wood, eight or nine inches long, and an inch thick on the back, whence it grows less and less to the extremity of the teeth, which are more or less apart, according to the greater or less degree of fineness of the intend-

ed work. Lastly, the needle is made in form of the common needle, only bigger and longer. Its use is to press close the wool and silks when there is any line or colour that does not fit well.

All things being prepared for the work, and the workman ready to begin, he places himself on the wrong side of the piece; with his back towards the design; so that he works as it were blind-fold, seeing nothing of what he does, and being obliged to quit his post, and go to the other side of the loom, whenever he would view and examine the piece, to correct it with his pressing needle. To put silk, &c. in the warp, he first turns and looks at the design, then, taking a broach full of the proper colour, he places it among the threads of the warp, which he brings cross each other with his fingers, by means of the coats or threads, fastened to the staff; this he repeats every time he is to change his colour. Having placed the silk or wool, he beats it with his reed or comb; and when he has thus wrought in several rows over each other, he goes to see the effects they have, in order to reform the contours with his needle, if there be occasion. As the work advances, it is rolled upon the lower beam, and they unroll as much warp from the upper beam, as suffices them to continue the piece: the like they do of the design behind them. When the pieces are wide, several workmen may be employed at once.

We have but two things to add: the first is, that the high-warp tapestry goes on much more slowly than the low-warp, and takes up almost twice the time and trouble. The second is, that all the difference that the eye can perceive between the two kinds, consists in this, that in the low-warp there is a red fillet, about one twelfth of an inch broad, running on each side from top to bottom, which is wanting in the high-warp.

But, for the satisfaction of our readers, we shall here present them with a representation of the loom for the manufacture of tapestry of the high-warp, or that in a situation perpendicular to the horizon. See plate CCLXX. fig. 1. where 1, 1, represent the loom-posts, or the thick planks, which support the rollers. 2, The rollers; the upper end holds the chain, the lower holds the tapestry, which is rolled upon it, according as the work goes forward: the threads are fastened at their ends to a sweet, or thick rod,

which is lodged in a groove made on each roller. 3, The two tantoes; one called the great tantoe, for turning the upper roller; the other the little tantoe, for turning the lower roller. 4, The pole of the leishes, which runs quite across the chain, takes up all the leishes, and brings them to the workman's hand. These leishes are little strings, tied by a slip-knot to each thread of the chain, to be raised up according as the chain sinks down: they serve to draw the particular thread which the weaver wants: he holds the thread separate from the rest, and passes a spindle of such a wool and colour as he thinks proper; then he lets the spindle hang down, and hinders the thread from running off, by a slip-knot. After having taken one or two threads of the fore-part of the chain by another leish, he brings the threads of the opposite side to him. By this alternative work he constantly makes them cross one another, to take in and secure the wool. In order to distinguish the threads of both sides, he is assisted by the cross-rod, which is put between two rows of threads. 5, A long tract of dots formed by the ends of the leishes, which take hold of the leishes of the chain by a slip-knot; and on the other hand encompass the pole of the leishes. 6, The cross-rod. 7, A little chain, each loop of which contains four or five threads of the warp, and keeps them perpendicular. 8, An iron-hook, to support the pole of the leishes. 9, 9, 9, The broacher-quill, to pass the threads of the wool, which is wound on it. 10, The comb, to strike in the work. 11, The end of the sweet let into the roller, in a groove.

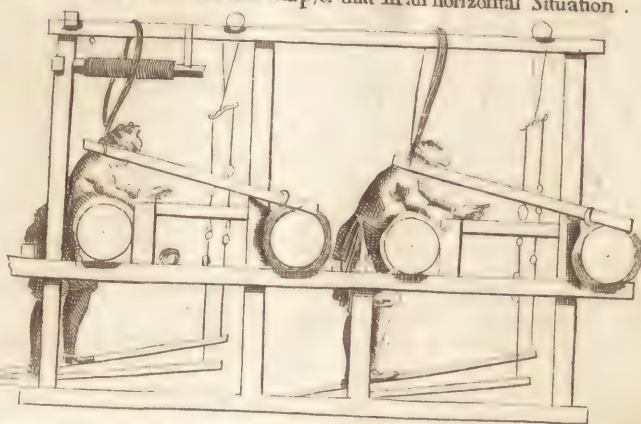
When the chain is mounted, the draughtsman traces the principal out-lines of the picture, which is to be wrought, with black chalk on the fore and back side of the chain. The weaver in the upright way having prepared a good stock of quills, filled with threads of all colours, goes to work, placed on the back part, as in the flat way, or in the manufacture of the low-warp. He has behind him his drawings, on which he frequently looks, that he may from time to time see how his work succeeds on the right or fore side, which the other cannot do.

The manufacture of TAPESTRY of the low-warp. The loom or frame wherein the low-warp is wrought, is much like that of the weavers; the principal parts thereof (*ibid.* fig. 2.) are two strong pieces of wood,

TAPESTRY-WEAVING .
Fig. 1. TAPESTRY-LOOM for the high warp, or that in a perpendicular Situation .



Fig. 2. TAPESTRY-LOOM for the low Warp, or that in an horizontal Situation .





wood, forming the sides of the loom, and bearing a beam or roller at each end; they are sustained at bottom with other long pieces of wood, in manner of trestles: and, to keep them the firmer, are likewise fastened to the floor, with a kind of buttresses, which prevent any shaking, though there are sometimes four or five workmen leaning on the beam at once. The rollers have each their trunnions, by which they are sustained; they are turned by large iron-pins, three feet long. Along each beam runs a groove, in which is placed the wick, a piece of wood above two inches diameter, and almost the length of the roller. This piece fills the groove intirely, and is fastened therein, from space to space, by wooden-pins. To the two wicks are fastened the two extremities of the warp, which is wound on the further roller, and the work, as it advances, on the nearer. Across the two sides, almost in the middle of the loom, passes a wooden bar, which sustains little pieces of wood, not unlike the beam of a ballance: to these pieces are fastened strings, which bear certain spring staves, wherewith the workman, by means of two treddles under the loom, on which he sets his feet, gives a motion to the coats, and makes the threads of the warp rise and fall alternately. Each loom has more or fewer of these spring-staves, and each staff more or fewer coats, as the tapestry consists of more or fewer threads. The design or painting the tapestry-man is to follow, is placed underneath the warp, where it is sustained from space to space with strings, by which the design is brought nearer to the warp. The loom being mounted, there are two instruments used in working of it, *viz.* the reed and the flute. The flute does the office of the weaver's shuttle: it is made of a hard polished wood, three or four lines thick at the ends, and somewhat more in the middle, and three or four inches long. On it are wound the silks, or other matters, to be used as the woof of the tapestry, represented. The comb, or reed, is of wood or ivory; it has usually teeth on both sides; it is about an inch thick in the middle, but diminishes each way to the extremity of the teeth; this serves to beat the threads of the woof close to each other, as fast as the workman has passed and placed them, with his flute, among the threads of the warp, as represented at 10. fig. 1.

The workman is seated on a bench before the loom, with his breast against the beam, only a cushion or pillow between them; and in this posture separating with his fingers the threads of the warp, that he may see the design underneath; and taking a flute, wound with the proper colour, he fastens it among the threads, after having raised or lowered them, by means of the treddles, moving the spring-staves and coats.

Lastly, to press and close the threads of the silk or yarn, &c. thus placed, he strikes each course (*i. e.* what the flute leaves in its passing and coming back again) with the reed.

That which is very remarkable in the manufacture of the low-warp, and which is common to it with the high, is, that it is all wrought on the wrong side; so that the workman cannot see the right side of his tapestry, until the piece is finished, and taken out of the loom.

TAPLINGS, in the english salt-works, the name given to certain bars of iron, which support the bottom of the pan in which the brine is boiled. See the article **SALT**.

These pans are very large, and cover a wide furnace; but as their width would make them apt to bend in the middle, which would spoil the working of the salt, there is a sort of wall made of brick carried along the middle of the furnace, and on the top of this are placed these taplings; they are about eight inches high, and from four to six in thickness, being smallest at the top. These are placed at about three foot distance one from another, and the wall which supports them, and which is called the midfeather, is broad at the base, and so narrow at the top, as barely to give room for the bases of the taplings.

TAPPING, in general, the act of piercing an hole in a vessel, and applying a tube or cannula in the aperture, for the commodious drawing off the liquors contained therein.

TAPPING, in agriculture, is the making an incision in the bark of a tree, and letting out the juice. To tap a tree at the root, is to open it round about the root. In the tapping of trees, the juice taken in from the earth, ascends from the root; and, after it is concocted and assimilated, in the branches, &c. it descends, like a liquor in an alembic, to the orifice or incision, where it issues out. One of the

most effectual ways of tapping, so as to obtain the greatest quantity of sap, and that in the shortest time, is not only to pierce the bark, or to cut the body of the tree almost to the pith with a chissel (as some have directed), but to bore through all the circles on both sides the pith, leaving only the outermost circle and the bark on the north-east side unpierced. This hole is to be bored sloping upwards, as large as the largest augre will make; and that also through and under a large arm near the ground; and thus it will not need any stone to keep open the orifice, nor tap to direct the sap into the receiver. This way the tree will, in a short time, afford liquor enough to brew withal; and with some of this sweet sap, one bushel of malt is said to make as good ale as four bushels of malt with ordinary water. The large maple, called the sycamore, is said to yield the best brewing sap, its juice being very sweet and wholesome. It is affirmed that the liquor which may be drawn from a birch, in the spring-time, is equal to the whole weight of the tree, branches, root, and all together.

To preserve the sap for brewing, insolate it by a constant exposure to the sun, in proper vessels, till the rest be gathered and ready, otherwise it will contract an acidity. When there is enough, put into it as much very thin cut and hard-toasted rye-bread, as will serve to ferment it; and when it works, take out the bread, and bottle up the liquor. A few cloves in each vessel that receives the sap, as it ooses from the tree, will also preserve it a twelvemonth.

TAPPING, in surgery. See the article **PARACENTESIS**.

TAPTE, a river of the hither India, which runs from east to west, through the province of Cambaya, and falls into the indian ocean, a little below Surat.

TAP-TO. See the article **TAT-TO**.

TAPUYERS and **TAPINAMBES**, two numerous tribes which the Portuguese found in Brasil, in South America, when they planted that country.

TAR, a thick, black, unctuous substance, obtained from old pines and fir-trees, by burning them with a close smothering heat: for the method of obtaining which, and the use of it in coating and caulking ships, &c. see the article **PITCH**.

With regard to the medical uses of tar, it may be observed, that it differs from the native resinous juice of trees, in hav-

ing received a disagreeable impression from the fire, and containing a portion of the saline and other juices, united with the resinous and oily; by the mediation of these, a part of the terebinthinate oil proves dissoluble in aqueous liquors, which extract little or nothing from the purer turpentine. See **TURPENTINE**.

Water impregnated with the more soluble parts of tar, proves, in consequence of this hot pungent oil, warm and stimulating: it sensibly raises the pulse, and quickens the circulation. By these qualities, in cold, languid, phlegmatic habits, it strengthens the solids, attenuates viscid juices, opens obstructions of the minuter vessels, and promotes perspiration and the fluid secretions in general; whilst in hot bilious temperaments, it disposes to inflammation, and aggravates the complaints which it has been employed to remove.

Tar-water has lately been recommended to the world as a certain and safe medicine in almost all diseases; a slow, yet effectual alternative in cachexies, scurvies, chlorotic, hysterical, hypochondriacal, and other chronic complaints; and a sudden remedy in acute distempers, which demand immediate relief, as pleurisies, peripneumonies, the small-pox, and all kinds of fevers in general. This medicine, though inferior to the character given of it, is, doubtless, in many cases, of considerable utility. It sensibly raises the pulse, and occasions some considerable evacuations, generally by perspiration or urine, though sometimes by stool or vomit: hence it is supposed to act by increasing the vis vitæ, and enabling nature to expel the morbid humours. We shall here insert, from the first public recommender of this liquor, Bishop Berkeley, some observations on the manner of using it. Tar-water, when right, is not paler than french, nor deeper than spanish white wine, and full as clear: if there be not a spirit very sensibly perceived in drinking, you may conclude the tar-water is not good. It may be drank either cold or warm; in colics, it is judged to be best warm. As to the quantity, in common chronic indispositions, a pint a day may suffice, taken on an empty stomach, at two or four times, to wit, night and morning, and about two hours after dinner and breakfast: more may be taken by strong stomachs. But those who labour under great and inveterate maladies, must drink a greater quantity, at least a quart every

every twenty-four hours: all of this class must have patience and perseverance in the use of this, as well as of all other medicines, which, though sure, must yet, in the nature of things, be slow in the cure of inveterate and chronical disorders. In acute cases, and fevers of all kinds, it must be drank in bed, warm, and in great quantity (the fever still enabling the patient to drink), perhaps a pint every hour; which has been known to work surprising cures. But it works so quick, and gives such spirits, that the patients often think themselves cured before the fever hath quite left them.

Ointment of tar is directed in the London Dispensatory to be made as follows: take of mutton-suet tried, and tar, each equal weights; melt them together, and strain the mixture whilst hot. This composition, with the addition of half its weight of resin, has long been used in the shops, as a cheap substitute to the black basilicon. See **BASILICON**.

Tar-pills are directed, in the Edinburgh Dispensatory, to be prepared as follows: take of tar any quantity at pleasure, mix it with as much elecampane-root as will reduce it into a proper thickness for being formed into pills. The powder, here mixed with it, though of no great virtue, is, nevertheless, a very useful addition, not only for procuring it a due consistence for taking, but likewise, as it divides the glutinous texture of the tar, and thus prevents its adhering to the intestines, and promotes its solubility in the animal juices. Each dram of the mass is formed into twelve pills, six of which are taken every morning and evening, in disorders of the breast, phthises, scurvies, &c. They are far more different in quality from tar-water, than might be at first expected; that nauseous draught has little heat, pungency, and bitterness: the water extracting only a small quantity of the hot oil, which becomes soluble by the mediation of the acid, produced in the preparation of the tar.

Some have imagined this acid to be the oily substance that gives virtue to tar-water; and hence have endeavoured so introduce an acid spirit, obtained from tar by distillation; but the effects of this, and all other acids, are directly contrary to those experienced, either from tar-water, or tar given in substance.

Barbadoes tar is nearly of the consistence of common tar, and of a reddish black colour and disagreeable smell. This bi-

tumen is found in several of our american islands, where it is esteemed, by the inhabitants, of great service as a sudorific, and in disorders of the breast and lungs; though in cases of this kind, attended with inflammation, it is certainly improper. They also apply it externally as a discutient, for preventing paralytic disorders. Among us it is rarely used, and not often to be met with genuine. The college employ it as a menstruum for sulphur, in the barbadoes balsam of sulphur; and direct an oil to be distilled from it.

TARACON, a city of Spain, in the province of Arragon, situated on the confines of old Castile: west long. $2^{\circ} 6'$, and north lat. $41^{\circ} 55'$.

TARAGON, a city and port-town of Spain, in the province of Catalonia, situated on the Mediterranean sea, in east long. $1^{\circ} 15'$, and north lat. $41^{\circ} 6'$.

TARANTISMUS, in medicine, the disease or affection of those bit by the tarantula. See the article **TARANTULA**. The patients under this malady are denominated tarantati.

TARANTO, a port-town of Italy, in the kingdom of Naples, situated on the gulph of Otranto, forty-five miles west of that city, being the see of an archbishop.

TARANTULA, in the history of insects, a species of araneus, with an oval hairy body and thick legs. See **ARANEUS**. This is one of the large spiders, but is not the very largest known: its body is three quarters of an inch long, and of the thickness of one's little finger: it is usually of an olive brown, variegated with a duskier colour; but in this it varies greatly: it is covered with a short and soft down, or hairiness; the points of its forceps are very fine and sharp: this species is a native of Apulia.

As to the effects of the poison they convey into the wound they make, there seems yet room for much explanation about it. We are told, that in the summer months, especially when the heats are greatest, as in the dog-days, the tarantula, creeping among the corn in the fields, bites the mowers and passengers: that in the winter it lurks in holes, and is scarcely seen; and that if it bites then, it is not so venomous, neither does it induce any ill symptoms: but in hot weather, according to Dr. Mead, although the pain of its bite is at first no greater than what is caused by the sting of a bee,

yet

yet the part is quickly after discoloured with a livid, black, or yellowish circle, and raised to an inflamed swelling; the patient within a few hours is seized with a violent sickness, difficulty of breathing, universal faintness, and sometimes trembling, with a weakness in the head; and on being asked his ailment, with a tremulous voice, and melancholy look, points to his breast, as if the heart was most affected: the patient grows by degrees more melancholy, stupid, and strangely timorous, and in a short time expires, unless music is called to his assistance, which alone, without the help of medicines, is said to perform the cure, the usual alexipharmics and cordial medicines, being of no service: for at the first sound of the musical instrument, although the sick lie as it were in an apoplectic fit, they begin by degrees, to move their hands and feet, till at last they get up, and fall to dancing, with wonderful vigour at first, for three or four hours; then they are put to bed, refreshed from their sweating a short time, and repeat their exercise, with the same vehemence, perceiving no weariness or weakness from it, but professing that they grow stronger and nimbler the more they dance. At this sport they usually spend twelve hours a day; and it continues three or four days, by which time they are freed from all their symptoms; which, nevertheless, attack them about the same time next year; and if they do not take care to prevent this relapse by music, they fall into the jaundice, want of appetite, universal weaknesses, and such like diseases, which are every year increased, if dancing be neglected, till at last they prove incurable. As music is the common cure, so they who are bitten are pleased, some with one sort of it, and some with another; one is pleased with a pipe, another with a timbrel, one with a harp, and another with a fiddle; so that the musicians sometimes make several essays before they can accommodate their art to the venom: but this is constant and certain, notwithstanding this variety, that they all require the quickest and briskest tunes; and are never moved by a slow dull harmony. While the tarantati are dancing, they lose in a manner the use of all their senses, are like so many drunkards, do many ridiculous and foolish tricks, talk and act obscenely and rudely, take great pleasure in playing with vine-leaves, with naked swords, red cloaths, and the like; and, on the other hand,

cannot bear the sight of any thing black, so that if any bytander happen to appear in that colour, he must immediately withdraw, otherwise they relapse into their symptoms with as much violence as ever. Baglivi, who resided in Italy, and probably had good opportunities of informing himself with respect to this insect, has written a treatise expressly upon the subject: and most medicinal writers mention the distempers arising from the bite thereof, as a thing certain.

But, notwithstanding all these great authorities, there is good reason to believe the whole story fabulous, and a vulgar error; for it is treated as such by an Italian physician, in the *Philos. Transact.* and a great many gentlemen of unquestionable veracity, who resided at Taranto many months, and during the time in which the bite of a tarantula is said to be most pernicious, affirm, that there was not a physician in the country, who believed there ever was such a distemper, from such a cause: that among the vulgar there is a tradition, that distempers attended with very extraordinary circumstances, had been excited by the bite of a tarantula; but that no body ever remembers a single instance; and that there is no other spider to be found in that country, different from those which are common in most warm countries.

TARANTOLA-FISH, a species of osmerus, with eleven rays in the pinna ani. See the article *OSMERUS*.

This fish is of the size of the smelt, or larger; the body is rounded, and the belly flat; its thickness is about that of a man's thumb, when its length is seven inches; the belly is white, the head is flattened, and there is a little furrow between the eyes; the opening of the mouth is very large, and the rostrum acute; there is in each jaw a single series of long teeth on each side of the palate; the back fin has twelve rays, and there is towards the extremity of the back a membranous appendage of the appearance of a fin, but without any rays; the pectoral fins have each thirteen rays.

TARASCON, a port-town of France, in the province of Provence, situated on the river Rhone, eight miles north of Arles.

TARBES, a city of France, in the province of Gascony, and territory of Bigorre, situated on the river Adour: west long. 3', and north lat. 43° 16'.

TARE, is an allowance for the outside pack-

package, that contains such goods as cannot be unpacked without detriment; or for the papers, threads, bands, &c. that inclose or bind any goods imported loose; or, though imported in casks, chests, &c. yet cannot be unpacked and weighed net. Several sorts of goods have their tares ascertained, and those are not to be altered or deviated from, in any case, within the port of London; unless the merchant thinking himself, or the officers of the crown, to be prejudiced by such tares, shall desire that the goods may be unpacked, and the net-weight taken; which may be done either by weighing the goods in each respective cask, &c. net; or (as is practised in east-india goods particularly) by picking out several casks, &c. of each size, and making an average, compute the rest accordingly. But this must not be done without the consent of two surveyors, attested by their hands in the land-waiter's books; and in the out-ports, not without the consent of the collector and surveyor. And as to those goods which have not their tares ascertained, two surveyors in London, and the collector and surveyor in the out-ports, are to adjust and allow the same, in like manner. Sometimes the casks, &c. are weighed beyond sea, before the goods are put in; and the weight of each respective cask, &c. marked thereon (as is usual for most goods imported from the british plantations), or else inserted in the merchant's invoice; in which case, if the real invoice be produced, and the officers have satisfied themselves (by unpacking and weighing some of them) that those weights are just and true, they do then, after having reduced them to british weight, esteem them to be the real tares, and pass them accordingly. But the unpacking goods, and taking the net-weight, being supposed the justest method, both for the crown and merchant, it is usually practised in the port of London, in all cases where it can be done with conveniency, and without detriment to the goods.

As the knowledge of tare is of great importance in commerce, we shall here add an alphabetical table of some principal articles in trade, with their tares, as allowed in the customhouse of London.

Alum in casks, tare 12 per cent.
Antimony in casks, 6 lb. per cent.
Ashes, called pot-ashes, 10 per cent.
Ashes, called weed-ashes, 8 lb. per sack.

Affa foetida, in baskets, about $\frac{1}{4}$ Cwt. 3 lb. per basket.

Barilla in double serons, 36 lb. per seron.

Beads, called coral-beads, in cases, if covered with rags, 3 per cent. for strings, paper, and rags; but if not covered with rags, then only 2 per cent.

Brimstone in casks, 8 lb. per cent.

Bugle, great, in casks, 3 per cent.

Camphor in tubs about $\frac{1}{2}$ or $\frac{3}{4}$ Cwt. tare 18 lb.

Canary-seeds in barrels of about $2\frac{1}{4}$ Cwt. at 30 lb. each.

Capers in casks, tare one third.

Cochineal in chests, covered with skins, containing about $1\frac{1}{2}$ Cwt. tare 50 lb.

Ditto in barrels, about $1\frac{1}{2}$ Cwt. tare 36 lb.

Ditto in bales of about 200 lb. each 18 lb. per bale.

Ditto in casks of about 250 lb. each, 42 lb. each.

Coffee in bales, from India, of about $2\frac{1}{2}$ Cwt. 18 lb. per bale.

Ditto in bales from Turkey, of about 3 Cwt. 15 lb. per bale.

Copper-ore in casks of near 2 Cwt. each, 21 lb. per cask.

Copperas-green, in casks of about $10\frac{1}{2}$ Cwt. 10 per cent.

Figs in barrels, 14 lb. per cent.

Flax, undressed, in bales or bags about $4\frac{1}{2}$ Cwt. 6 lb. each.

Galls, from Aleppo and Smyrna, in double bags, 7 lb. each.

Gum-arabic in sacks about 3 Cwt. 10 lb. per sack.

Hemp in fats, 14 lb. per cent.

Hops in bags, 4 lb. per cent.

Indigo in chests, covered with skins, about $1\frac{3}{4}$ Cwt. 48 lb.

Ditto in bales, with skins, about $1\frac{1}{2}$ Cwt. tare 16 lb.

Iron, old bushel, in casks about 13 Cwt. 107 lb. each.

Madder, great and small, single and double bags, tare 28 lb.

Pearl-barley in casks of about $4\frac{1}{2}$ Cwt. 45 lb. per cask.

Pepper, long, from India, in bags about 1 Cwt. 8 lb. per bag.

Pitch, called burgundy-pitch, in stands about $2\frac{1}{4}$ Cwt. tare 56 lb.

Prunelloes in boxes about 14 lb. 3 lb. per box.

Rice in barrels about 4 Cwt. tare as on the casks.

Sago, from India, in bags about 94 lb. 3 lb. each.

Salt-

Salt-petre in casks, 12 lb. per cent.
Smalts, or powder-blue, in casks, about
4 Cwt. 10 per cent.—
Soap, called castile soap, in double se-
rons about 3 Cwt. 30 lb.

Tallow, from Russia and Ireland, in
casks, 12 lb. per cent.

Turpentine in casks, tare one fifth part.

Wax, bees-wax in casks about 10 Cwt.
84 lb. per cask.

Spanish wool in bales, for cloth, about
2 Cwt. tare 28 lb.

TARENTAIS DUTCHY, the south divi-
sion of Savoy, having Piedmont on the
south-east, and Savoy proper on the north-
west: subject to the king of Sardinia.

TARGET, a kind of shield or weapon of
defence made use of by the antients.

TARGOROD, a town of Turkey in Eu-
rope, in the province of Moldavia, fifty
miles south-west of Jazy: east long. 26°
 $30'$, and north lat. 47° .

TARGUM, a name whereby the Jews call
the chaldee paraphrases, or expositions, of
the Old Testament, in the chaldee lan-
guage. After the captivity, the jewish
doctors, in order to make the people un-
derstand the holy scripture, which was
read in hebrew in their synagogues, were
obliged to explain the law to them in a
language they understood, which was the
chaldean, or that used in Assyria. The
targums now remaining, were composed
by different persons, upon different parts
of scripture, and are eight in number.

TARIF, or **TARIFF**, a table or catalogue,
containing the names of different sorts of
merchandise, with the duties to be paid,
as settled by authority, amongst trading
nations.

TARIFFA, a port-town of Spain, in the
province of Andalusia, situated at the en-
trance of the streights of Gibraltar, eigh-
teen miles west of Gibraltar, and twenty-
four miles north of Tangier: west long.
 $6^{\circ} 15'$, and north lat. 36° .

TARKU, a port-town of Persia, in the pro-
vince of Chirvan and territory of Dagis-
tan, situated on the west side of the Cas-
pian sea, three hundred miles south of
Astracan: east long. 51° , north lat. 42° .

TARO, a river of Italy, which rises in the
mountains on the confines of Genoa, and
runs north-east thro' the dutchy of Par-
ma, falling into the Po below Cremona.

TARODANT, a city of Morocco, in Af-
rica, in the territory of Sus, situated near
the Atlantic ocean, one hundred and
twenty miles south of the city of Moroc-
co: west long. 10° , and north lat. 30° .

TARPAULIN, a piece of canvas, well
tarred over, to keep off the rain from any
place. The term is also often applied in
a burlesque sense to a person that has been
all his life bred to the sea.

TARPEIAN, in roman antiquity, an ap-
pellation given to a steep rock in Rome;
whence, by the law of the twelve tables,
those guilty of certain crimes were preci-
pitated.

TARPEIAN GAMES, the same with those
otherwise called capitoline. See the ar-
ticle **CAPITOLINE GAMES**.

TARRACE, or **TERRACE**, a kind of
plaster or mortar. See **TERRACE**.

TARSO, in the glass-trade, a white kind
of stone, used instead of sand, for the
finest crystal glass. See **GLASS**.

TARSUS, in anatomy, the space between
the bones of the leg and the metatarsus,
wherein are contained seven bones, *viz.*
the astragalus, calcaneum, os naviculare,
os cuboides, and the three ossa cuneiformia. See **ASTRAGALUS**, &c.

If any of these bones happens to be lux-
ated, they should be speedily replaced;
for which purpose the foot should be ex-
tended on an even table, and the surgeon
is to replace the dislocated bones with the
pressure of the palms of his hands, ad-
justing them also with his fingers, where-
need requires. Compresses, dipped in
warm spirit of wine, are then to be laid
on the part, and both these and the re-
duced bones secured in their places, by
means of the proper bandages: the pa-
tient is then to be enjoined to remain in
bed, till the new set bones have acquired
a sufficient strength.

TARSUS is also used by some for the carti-
lages which terminate the palpebrae, or
eyelids, and from which the cilia or hairs
arise. See the article **EYE**.

TARSUS, now Teraffo, once the capital of
Cilicia, in the lesser Asia, now a pro-
vince of Asiatic-Turky, is situated on the
north side of the Levant-Sea: east long.
 35° , north lat. 37° .

TARTAN, in naval architecture, a kind
of bark, used in the Mediterranean, for
fishing and carriage. It has only a main-
mast and a mizzen; its sails are triangu-
lar; and when a square sail is put up
it is called a sail of fortune.

TARTAR, in natural history and phar-
macy, a hard and almost stony separation
from a vegetable juice, after fermenta-
tion. See **FERMENTATION**.

The common tartar is the produce of
wine, being found in large masses, ad-
hering

hering to the bottoms and sides of casks, in which that liquor has been long kept. We meet with it in large masses of an irregular figure, and more or less dense texture, without smell, and of a subacid taste.

The common crude tartar is of two kinds, the white and the red; this difference of colour, being owing to that of the wine they are produced from, is of little consequence in itself, but it is an indication of more essential differences in the matter. The white tartar is much more pure and clean than the red, and is, though equally hard, considerably less heavy. We have this principally from Germany, where it is, at times, cleared off from the sides of very large vessels, in which they keep their white wines for many years. The red tartar is brought in large quantities from Italy, and some parts of France. The white tartar is to be chosen for medicinal use, and particularly such as is of a compact texture, not spongy or cavernous, when broken, and free from dirt, or other foulnesses, and such as has a sort of crystallizations on its surface. Tartar is, properly speaking, the essential salt of the grape. Tartar contains a large portion of acid salt, and of an oil, in part thin and limpid, in part thick and coarse. It affords a small portion of a volatile alkali salt in distillation, and the residuum yields a very large proportion of fixed alkali. It is to be observed, that both these alkalies seem, in some degree, creatures of the fire; for neither of them manifest themselves either by their taste or qualities in the tartar, any more than in many other substances, which yet afford much of them by analysis, till they have felt the operation of the fire.

Tartar dissolves in boiling-water, but with great difficulty in cold; and even when purified, and brought to the state of what we call crystal, or cream of tartar, it retains the same quality. Tartar is scarce ever given internally in its crude state.

The preparations now in use are these.

Crystals of TARTAR. Powder a quantity of white tartar, and boil it in a sufficient portion of water till it be in a great part dissolved, the foulness only remaining behind. Pour this decoction, while hot, through a flannel-bag, let it stand till cold, and there will be crystals formed at the sides of the vessel; these are the crystals of tartar. They may be dissolved by boiling a second time, and set to shoot again, and by this means they will be

rendered the more pure. The French, who prepare great quantities of these crystals about Montpellier, first dissolve a small quantity of white earth of the nature of chalk, in the water in which they are to be boiled, for the second solution. This earth renders the water milky, but the crystals shoot perfectly clear in it, and whatever foulness they carried with them at their first shooting, will be, by this means, more perfectly separated from them.

It was formerly a custom to separate first the salt which shot to the top of the liquor in form of a thin skin or film, and this was supposed purer than the rest, and called cream of tartar; but it is wholly the same with the crystals that shoot to the sides of the vessel, and nobody now trouble themselves to keep it separate.

The crystals of tartar, or, as we commonly express it, cream of tartar, is a gentle purge; it attenuates and resolves tough humors, and is good against obstructions of the viscera, and in cachectic complaints.

Fixed salt of TARTAR. Take any quantity of tartar at pleasure, put it into a crucible, and calcine it for eight hours in an open fire; then pour boiling water on it, and set it over the fire till all the salt be dissolved. Filtre the solution, and evaporate it to a dryness in a sand-bath; there will remain, at the bottom of the vessel, a white fixed alkaline salt. If it is not so pure as it ought to be, dissolve it in fair-water; filtre the solution, and evaporate it to a dryness as before; after which it may be calcined for half an hour in a crucible; it will then be perfectly pure, and must be kept in a phial close stopped, for it easily melts if the air comes to it.

If this salt be exposed to a damp air, as in a vault, or other such place, in a flat earthen vessel, it runs into a heavy liquor, which is to be filtered, to separate it from any foulness it may have accidentally contracted, and is the oleum tartari per deliquium.

The fixed salt of tartar is very acrid and caustic; some attribute great virtues to it, as a diuretic; and our apothecaries too frequently use it in the place of salt of wormwood. They, indeed, buy it as such; and what is yet more unfair in the seller, is, what he calls by either of these names of salt of tartar or salt of wormwood, as it is more or less purified, is often not truly either, but is prepared from the

common russia pot-ash, dissolved and purified. This fixed alkali is of great use in opening the bodies of resinous and sulphureous subjects, and making them yield a stronger tincture to spirit of wine, or water, than they otherwise would do. It is often mixed also with purges to quicken the operation. Caution ought to be taken, when it is given internally, either that it be first dissolved by an acid, as in the saline draughts; or else blended with a large quantity of liquor, to prevent its proving too acrid as it passes the oesophagus.

Tincture of salt of TARTAR. Put a quantity of salt of tartar into a good crucible; set it in an open fire, and calcine it for some hours, raising the fire, at last, to such a degree as to make the salt ready to melt; then pour it into a clean marble mortar, grind it some time, and while yet hot, put it into a matrafs heated beforehand; pour a quart of rectified spirits of wine on four ounces of this calcined salt, and let it stand in a sand-heat three or four days, in which time, if the process have been rightly managed, the spirit will become of a strong yellowish colour, and is then to be filtered off for use.

People who make this tincture, find it difficult to give the spirit the true colour. This tincture is attenuant and resolvent, given from ten to thirty drops: it is also of great use in extracting the tinctures of vegetable and mineral substances, which would not impart any colour to simple spirit of wine.

Foliated TARTAR, or regenerated TARTAR. Take any quantity of dry salt of tartar powdered, put it in a large glass vessel, and pour thereon, by degrees, as much spirit of vinegar as will saturate the salt; filtre the fluid, and evaporate it over a gentle fire to driness, taking great care that the matter does not contract any empyreuma. On the salt which remains after this evaporation, pour out as much fresh vinegar as will again saturate it; then filtre the fluid, and carefully dry it by evaporation.

This salt has a febrifuge and deobstruent quality. The dose may be from ten grains to one scruple, to be taken in a glass of water, and repeated every fourth or sixth hour, according to the exigence of the case.

Emetic TARTAR, a preparation of antimony with tartar. See *ANTIMONY*.

Soluble TARTAR is thus made: Dissolve a

pound of fixed alkaline salt in a gallon of boiling-water, and gradually throw in crystals of tartar as long as a fresh addition thereof raises any effervescence, which generally ceases before three pounds of the crystals have been used: then filtre the liquor; and, after due evaporation, set it by to crystallize. This salt has been long esteemed both as a medicine and a menstruum: it is aperient, attenuates viscid juices, promotes the urinary secretion, and gently loosens the belly: the dose is from ten grains to a dram or two, or more. It is also used as an addition to the resinous purgatives, as it promotes their action, and at the same time prevents their griping quality.

Vitriolated TARTAR is ordered, by the College of London physicians, to be made thus: Dissolve eight ounces of green vitriol in four pints of boiling water; and while the liquor continues boiling, throw into it salt of tartar, or any other alkaline salt, till no effervescence arises upon throwing in a fresh addition, which generally happens when four ounces, or a little more of the salt have been used: filtre the liquor through paper, and after due evaporation set it by to crystallize.

Vitriolated tartar is aperient; exhibited in small doses of a scruple, or half a dram, attenuates viscid juices, and promotes the fluid secretion. In larger doses it proves a mild and safe cathartic.

TARTARY, a vast country in the northern parts of Asia, bounded by Siberia on the north and west: this is called Great-Tartary. The Tartars who lie south of Moscow and Siberia, are those of Astracan, Circassia, and Dagistan, situated north-west of the Caspian-sea: the calmuc Tartars, who lie between Siberia and the Caspian-sea: the usbec Tartars and Moguls, who lie north of Persia and India: and, lastly, those of Tibet, who lie north west of China.

TASSEL, a sort of pendant ornament at the corners of a cushion; or the like.

In building, tassels denote those pieces of board that lie under the ends of the mantle trees.

TASSO, or *THASSUS*, a small island in the Archipelago, thirty miles north of Lemnos.

TASTE, in physiology, a peculiar sensation excited by means of the organs of taste, viz. the papillæ on the tongue. See the article *TONGUE*.

The tastes of bodies depend on a certain determinate magnitude of their particles, adapted

adapted to excite different sensations by means of the papillæ of the tongue. Savours, which are the objects of the taste in general, proceed chiefly from the saline parts, which are found in all matters, whether animal or vegetable, which we take either as food or physic. These little angular pungent bodies are fitter than others to penetrate even to the immediate organ, and to make themselves perceived there: we may judge of them by putting a grain of pure salt, of any kind whatever, upon the tongue, where it will make a very strong impression; and their analysis discovers, that, of all mixed bodies, those that affect the organ most, are such as abound most in salts. See the article **SALT**.

The most simple flavours, and upon which men are more generally agreed, are those wherein the salts are the least mitigated by the mixture of other matters. Every one knows what is meant by salt, sour, sweet, bitter, harsh, &c. these different sensations are so remarkable that they are presently distinguished: they are, as it were, the basis of all others, which become so much the more difficult to describe and express, the more they recede from their primary simplicity. The bitterness of coffee, for example, corrected by the sweetness of sugar, produces a mixed sensation; the juice of fruits, mingled with spirit of wine, takes a new taste: the taste of viſuals changes almost entirely, and is disguised a thousand different ways, by that infinite number of preparations and mixtures, which the present age has rendered an important art.

TASTE is also used, in a figurative sense, for the judgment and discernment of the mind.

We constantly hear talk of good and bad taste, without well understanding the meaning of these terms: in effect, a good taste seems, at bottom, to be little else but right reason, which we otherwise express by the word judgment. Mad. Scudery, and Mad. Dacier, call good taste a harmony between the mind and reason; and according as that harmony is more or less just, the person has more or less of this taste.

TATA, or **SINDA**, the capital of a province of the same name in the higher India, in Asia, situated at the mouth of the Indus: east longitude 68°, north latitude 25° 40'.

TATIANITES, in church-history,

christian heretics in the second century; so called from their leader Tatian, a disciple of St. Justin.

This heresiarch took from Valentinus the fable of the Æons, and from Marcion the doctrine of two principles. But what particularly distinguished his followers was, their condemning of marriage, and forbidding the eating of flesh or drinking of wine.

TATTERSHALL, a market-town of Lincolnshire, eighteen miles south-east of Lincoln.

TAT-TOO, q. d. **TAP-TO**, a beat of a drum at night, to advertise the soldiers to retreat or repair to their quarters in their garrison, or to their tents in a camp.

TAU, or **TAW**, in heraldry, an ordinary in figure of a T, supposed to represent St. Andrew's cross, or a cross potency, the top part cut off. See **CROSS**.

TAVASIUS, the capital of the province of Tavastia, in the territory of Finland, in Sweden, situated eighty-four miles north-east of Abo: east long. 24°, north lat. 61° 20'.

TAUBER, a river of Germany, which, rising in Franconia, passes by Mergentheim, and falls into the river Maine at Wertheim.

TAVERNA, a town of the further Calabria, situated seventy miles north-east of Reggio.

TAUGHT, or **TAU'T**, in the sea-language, signifies the same as stiff, or fast: thus, to set taught the shrouds, or stays, is to make them more tight and stiff.

TAVIRA, a city of Algarva, in Portugal: west long. 8° 32', north lat. 37°.

TAVISTOCK, a borough of Devonshire, thirty-two miles west of Exeter.

It sends two members to parliament, and gives the title of marquis to the noble family of Russels, dukes of Bedford.

TAUNT, or **TAUNT-MASTED**, is said of a ship whose masts are too tall for her.

TAUNTON, a borough of Somersetshire, twenty miles south-west of Wells.

It sends two members to parliament.

TAURILIA, in roman antiquity, certain religious games, celebrated to appease the infernal gods.

TAURIS, or **TABRIS**, a city of Persia, four hundred miles north of Ispahan: east long. 46° 30', north lat. 38° 20'.

TAURUS, the **BULL**, in zoology. See the article **BULL**.

TAURUS, in astronomy, one of the twelve signs of the zodiac, the second in order, consist-

consisting of forty-four stars, according to Ptolomy; of forty-one, according to Tycho; and of no less than one hundred and thirty-five, according to the britannic catalogue. See the article ZODIAC.

TAURUS is also the name of a ridge of mountains which run through the lesser Asia, from west to east.

TAUTOLOGY, in rhetoric, a needless repetition of the same thing in different words.

TAW, or **TAU**. See the article **TAU**.

TAWING, the art of dressing skins in white, so as to be fit for divers manufactures, particularly gloves, &c.

All skins may be tawed; but those chiefly used for this purpose are lambs, sheep, kids, and goat-skins.

The method of tawing is this: Having cleared the skins of wool or hair, by means of lime, &c. as described under the article **SHAMMY**, they are laid in a large vat of wood or stone, set on the ground full of water, in which quick-lime has been slaked, wherein they are allowed to lie a month or six weeks, according as the weather is more or less hot, or as the skins are required to be more or less soft and pliant.

While they are in the vat, the water and lime is changed twice, and the skins are taken out and put in again every day; and when they are taken out for the last time, they are laid all night to soak in a running water, to get out the greatest part of the lime; and in the morning are laid together by sixes one upon another, upon the wooden leg (and are scraped stoutly one after another, to get the flesh off from the fleshy side, with a cutting two handled instrument called a knife, and then they cut off the legs, if they are not cut off before) and other superfluous parts about the extremes. Then they are laid in a vat or pit with a little water, where they are fussed with wooden pestles for the space of a quarter of an hour, and then the vat is filled up with water, and they are rinsed in it.

In the next place, they are thrown on a clean pavement to drain, and afterwards cast into a fresh pit of water, out of which they rinse them well, and are laid again on the wooden leg, six at a time, with the hair-side outermost, over which they rub a kind of whetstone very briskly to soften and fit them to receive four or five more preparations, given them on the leg, both on the flesh side and the hair-

side, with the knife, after the manner above mentioned.

After this they are put into a pit of water and wheaten-bran, and stirred about in it with wooden poles, till the bran is perceived to stick to them, and then they are left; as they rise of themselves to the top of the water by a kind of fermentation, they are plunged down again to the bottom, and at the same time fire is set to the liquor, which takes as easily as if it were brandy, but goes out the moment the skins are all covered.

They repeat this operation as often as the skins rise above the water; and when they have done rising they take them out, lay them on the wooden leg, the fleshy side outwards, and pass the knife over them to scrape off the bran.

Having thus cleared them of the bran, they lay the skins in a large basker, and load them with huge stones to promote their draining: and when they have drained sufficiently, they give them their feeding, which is performed after the manner following:

For one hundred of large sheep-skins, and for smaller in proportion, they take eight pounds of alum, and three of sea-salt, and melt the whole with water in a vessel over the fire, pouring the dissolution out, while yet luke-warm, into a kind of trough, in which is twenty pounds of the finest wheat flower, with the yolks of eight dozen of eggs; of all which is formed a kind of paste, a little thicker than children's pap; which, when done, is put into another vessel, to be used in the following manner:

They pour a quantity of hot water into the trough in which the paste was prepared, mixing two spoonfuls of the paste with it; to do which they use a wooden spoon, which contains just as much as is required for a dozen of skins; and when the whole is well diluted, two dozen of the skins are plunged into it; but they take care that the water be not too hot, which would spoil the paste and burn the skins.

After they have lain some time in the trough, they take them out, one after another, with the hand, and stretch them out; this they do twice; and after they have given them all their paste, they put them into tubs, and there fust them afresh with wooden pestles.

Then they put them into a vat, where they are suffered to lie for five or six days,

or more; then they take them out in fair weather, and hang them out to dry on cords or racks, and the quicker they are dried the better; for if they be too long a drying, the salt and alum within them are apt to make them rise in a grain, which is an essential fault in this kind of dressing.

When the skins are dry, they are made up into bundles, and just dipt in fair water, and taken out and drained; and being thrown into an empty tub, and after having lain some time are taken out and trampled under foot.

Then they draw them over a flat iron-instrument, the top of which is round like a battledore, and the bottom fixed into a woollen block, to stretch and open them; and having been opened, they are hung in the air upon cords to dry; and being dry, they are opened a second time, by passing them again over the same instrument.

In the last place they are laid on a table, pulled out, and laid smooth, and are then fit for sale.

After the same manner are dressed horses, cows, calves-skins, &c. for the saddlers, harness-makers, &c. as also those of dogs, wolves, bears, &c. except that in these they omit using the paste, salt and alum-water being sufficient.

TAX, a tribute rated upon every town, which formerly was wont to be paid annually into the King's-exchequer, but now not without consent of parliament; it differs from a subsidy in this, that it is always certain, as set down in the exchequer-book, and in general levied of every town, and not particularly of every man, &c. The ancient way of levying taxes was by tenths and fifteenths, afterwards by subsidies and royal aids, and at length by a pound rate; the former of these were all upon the person and personal estate, but the last upon lands and rents. In the late reigns, a land-tax has been annually granted of two, three, or four shillings in the pound, according to present exigencies, to be levied by commissioners in the several counties, cities, towns, &c. And in respect of this tax, the tenant, or occupiers, of the land are to be charged or assessed, and the same deducted out of the rent due to the landlords; and if any persons refuse to pay what they are rated, the collectors in every parish may levy it by distress and sale of their goods; but in case they are over-rated, they may be relieved by an

appeal to the commissioners, who have power to charge the overplus on others, as they shall see cause; or where there appears to be a deficiency, they may make a re-assessment, &c. See **TRIBUTE**, &c.

TAXIS, a term used by Vitruvius for what is now called ordonnance, being that which gives every part of a building its just dimensions with respect to its uses. See the article **ORDONNANCE**.

TAXUS, the **YEW-TREE**, in botany, a genus of the dioecia-monodelphia class of plants, without any corolla. The calyx of the male flower is composed of three leaves: the stamina are numerous: the seed is single, and surrounded by an undivided baccated calyx: the tree is very slow in growing, but there are many very large ones upon some barren cold soils in divers parts of England: the timber is much esteemed for many uses.

TAXUS, in zoology, a name used by some authors for the meles, or badger. See the article **MELES**.

TAY, a river of Scotland, rising from the loch, or lake, of Tay, in Broadalbin, and running east through Athol: it afterwards turns south-east, and dividing the counties of Perth and Angus from Strathern and Fife, falls into the frith of Tay.

TAYVEN, a city of China, in Asia, in the province of Xanfi, two hundred and forty miles south-west of Pekin: east long. 108°, north lat. 38° 30'.

TCHELMINAR. See **CHILMINAR**.

TEA, *thea*, in botany, a genus of the polyandria-monogynia class of plants, the corolla of which consists of six large, roundish, hollow, equal petals: the fruit is a capsule, formed of three globular bodies growing together: it contains three cells, in each of which is a single seed, globose, and internally angulated. This shrub grows to five or six feet high, and is very ramose: its root is spreading and fibrous: the leaves are about an inch long, near half an inch broad, serrated, and terminating in a point. The traders in tea distinguish a vast many kinds of it, as they differ in colour, flavour, and the size of the leaf. They are all, however, the leaves of the same tree, only differing according to the seasons when they are gathered, and the manner of drying. To enumerate the several subdivisions were endless; the general division is into three kinds, the ordinary green-tea, the finer green, and the bohea; to one or other of which all

the other kinds may be referred. The common green-tea has somewhat small and crumpled leaves, much convoluted, and closely folded together in the drying. Its colour is a dusky-green, its taste sub-astringent, and its smell agreeable. It gives the water a strong yellowish-green colour. The fine green has larger leaves, less crumpled and convoluted in the drying, and more lax in their folds; it is of a paler colour, approaching to the blue-green, of an extremely pleasant smell, and has a more astringent, yet more agreeable, taste than the former. It gives a pale-green colour to water. To this kind are to be referred all the higher priced green teas, the hyson, imperial, &c. The bohea consists of much smaller leaves than either of the other, and those more crumpled and closely folded than in either. It is of a darker colour than the other, often blackish, and is of the smell and taste of the others, but with a mixed sweetness and astringency. The green teas have all somewhat of the violet-flavour; the bohea has naturally somewhat of the rose-smell. The leaves when gathered are dried with great caution, partly by the help of heat, partly by the air, and when thoroughly prepared will keep a long time fresh and good. Every parcel, when dried, though gathered promiscuously, is separated, according to the largeness and smallness of the leaves, into three or four different kinds, each of which is of a different price, and has its different name. The bohea tea is gathered before the leaves are perfectly opened, and is made to undergo a greater degree of heat in the curing, to which its colour and peculiar flavour is in a great measure owing.

Tea, moderately and properly taken, acts as a gentle astringent and corroborative: it strengthens the stomach and bowels, and is good against nausea, indigestions, and diarrhoeas. It acts also as a diuretic and diaphoretic; but its virtues in these particulars are in a great measure to be attributed to the quantity of warm water drank on the occasion. The good qualities of tea do not prevent its often doing harm. Even in China, where the virtues of tea are so vastly extolled, the people who drink it to great excess are often thrown into diabetes, and die emaciated by it.

Tea, imported from India, for every 100 pound, gross value, at the sale, pays

a duty of 18l. 18s. $7\frac{66\frac{1}{2}}{100}$ d. And an inland duty for every pound weight, one shilling; and for every hundred pounds, gross value, at the sale, twenty five pounds.

TEAL, or TEALE, in ornithology, the anas, with a green spot on the wing, and a white line both above and below the eyes; being the smallest, most elegant and valuable of all the duck-kind. See the articles ANAS and CIRCIA.

TEARS, *lachryma*, a lymph or aqueous humour, which is subtle, limpid, and a little saltish: it is separated from the arterial blood by the lachrymal gland and small glandulous grains on the inside of the eye-lids. This fluid serves to moisten and deterge the eyes and the eye-lids, after which it tends to the internal angle of the eye, and is absorbed by the puncta lachrymalia, and conveyed into the lachrymal bag, from whence it goes into the nose, by the nasal canal. See the article LACHRYMALIA.

TEASEL, or TEAZEL, in botany. See the article DIPSACUS.

TEBETH, the tenth month of the Jewish ecclesiastical year, and fourth of the civil. It answers to our month of December.

TECKLENBURG, a city of Germany, in the circle of Westphalia, capital of a county of the same name, thirteen miles south-west of Osnabrug, subject to its own count: east long. $7^{\circ} 20'$, north $52^{\circ} 21'$.

TECHNICAL expresses somewhat relating to arts or sciences: in this sense say technical terms. It is also particularly applied to a kind of verses wherein contained the rules or precepts of an art, thus digested to help the memory retain them; an example whereof may be seen in the article MEMORY.

TECUM DUCES. See DUCES.

TE DEUM, the name of a celebrated hymn, used in the christian church, so called because it begins with the words, *Te Deum laudamus*; We praise thee, O God. It is sung in the reformed church, with great pomp and solemnity upon the gaining of a victory, or on a happy event.

TEETH. See the article TOOTH.

TEES, a river which rises on the coast of Cumberland, and running eastward divides the county of Durham from Yorkshire, and falls into the German sea below Stockton.

TEF

TEFLIS, the capital of persian Georgia, in Asia, situated on the river Kur, or Cyrus, three hundred miles north of Tauris, and as many south of Astracan: east long. $47^{\circ} 20'$, north lat. 43° .

TEGAPATAN, a port-town of the hither India, in Asia, near Cape Comorin, eighty miles south of Cochin, and a hundred and sixty north-west of Columbo in Ceylon: east long. 76° , north lat. 8° .

TEGUMENT, or **INTEGUMENT**, any thing that surrounds or covers another.

The common teguments of the human body are the cutis, cuticle, and fat. See the article **CUTIS**, &c.

TEHAMA, one of the divisions of Arabia felix, in Asia, situated on the Red-sea, between the provinces of Mecca and Hadramut.

TEINTS and **SEMI-TEINTS**, in painting, denotes the several colours used in a picture, considered as more or less high, bright, deep, thin or weakened, and diminished, &c. to give the proper relievo, softness, or distance, &c. of the several objects.

TEIRCE, or **TIERCE**. See **TIERCE**.

TEISSE, or **TEYS**, a river of Hungary, which rises in the Carpathian mountains, and running from east to west, passes by Tockay; then turning south, passes by Zolnock and Segedin, and having joined the river Merish, falls into the Danube, opposite to Salankamen.

TEKUPHÆ, or **THEKUPHÆ**, in the jewish chronology, are the times wherein the sun proceeds from one cardinal point to the next.

TELAMON, or **ATLAS**, a name given to those figures or half figures of men so commonly used instead of columns or pilasters, to support any member in architecture, as a balcony, or the like.

TELAUGIA, in natural history, a genus of scrupi, of a glittering appearance, usually containing flakes of talc, and emulating the structure of the granites. See the article **SCRUPI**.

Of this genus Dr. Hill reckons no less than twelve species. 1. The hard, shining, black, and white telaugium. 2. The hard, shining, red, and white telaugium. 3. The red telaugium, variegated with white and black. 4. The hard, heavy telaugium, of a greyish black, variegated with white. 5. The brownish, red telaugium, variegated with white and yellowish. 6. The reddish white telaugium, variegated with black and a gold colour. 7. The hard, white

telaugium, variegated with brown. 8.

The bluish, white, brittle telaugium.

9. The brown, friable telaugium, variegated with yellow. 10. The hard, purplish, brown telaugium, variegated with white and yellow. 11. The heavy, red telaugium, variegated with black and white. And, 12. The hard, bluish, green telaugium, variegated with white.

TELEPHIUM, in botany, a genus of the pentandria-trigynia class of plants, the corolla of which consists of five erect, oblong, obtuse petals, narrowest at the base; the fruit is a short triquetrous capsule, formed of three valves, and having only one cell; the receptacle is free, and of about half the length of the capsule; the seeds are numerous and roundish.

TELESCOPE, an optical instrument consisting of several lenses, by means of which remote objects are so magnified as to appear nigh at hand. See **LENS**.

That the telescope is of a modern invention is most certain; neither does it appear that microscopes, or optic glasses of any kind, were known to the antients. It is contended, that Alexander de Spina, a native of Pisa, was the first that made the use of glasses known to the world; but our countryman, friar Bacon, who died twenty-one years before him, was, in all probability, acquainted with them first; for he wrote a book of perspective, in which he plainly shews that he did not only understand the nature of convex and concave glasses, but the use of them when combined in telescopes; though he no where, in that treatise, discovers the manner in which they are to be put together. The telescope, with the concave eye-glass, was first invented by a mechanic of Middleburgh in Zealand, called Z. Johannides, about the year 1590, tho' J. Lipperhoy, another Dutchman, is candidate for the same discovery. From whence this sort of telescope is called *tubus batavus*.

Franciscus Fontana, a Neapolitan, contends, that he was the first contriver of the telescope composed of two convex glasses, which is now the common astronomical telescope; and Rheita pretends to be the first that rendered that telescope fit for terrestrial uses, by adding two eye-glasses to it.

The telescope is of two sorts, *viz.* dioptric, or refracting; or cata-dioptric, by reflection and refraction conjointly.

Dioptric or refracting TELESCOPE consists of an object-glass *xx* (plate CCLXXI. fig. 1.) by which the image *fd* of an object

ject OB, at a distance, is formed in the focus e of the said glass, and in an inverted position. This image may be viewed by a single lens, ab , placed at its focal distance, as is usually done for viewing the heavenly bodies, because in them we do not regard the position: but for viewing objects near us, whose image we would have erect, we must, for that purpose, add a second lens pq , at double its focal distance from the other, that the rays which come from ab may cross each other in the focus o , in order to erect the image gn , which it will form in its own focus m , because the rays come parallel from the first lens ab . Lastly, a third lens ic is added, to view the secondary image gn . These three lenses, or eye-glasses, are usually of the same size and focal length; and the power of magnifying is always as the focal length of the object-glass ew divided by the focal length of the eye-glass lm or be : for instance, suppose $ew = 10$ feet or 120 inches, and be or $lm = 3$ inches; then will the object appear to the eye, through such a telescope, 40 times bigger than to the naked eye; and its surface will be magnified 1600 times, and its bulk or solidity 64000 times.

If instead of a convex eye-glass we should use a concave one of the same focal length, it would represent the object erect, equally magnified, and more distinct and bright; but the disadvantage of this glass is, that it admits but of a small area, or field of view, and, therefore, not to be used when we would see much of an object, or take in a great scope; but it is used to great advantage in viewing the planets and their satellites, saturn's ring, jupiter's belts, &c.

The magnifying power of a refracting telescope is thus estimated; let AB (*ibid.* fig. 2.) be the object-glass, and CD the eye-glass; and let HFI and GFM be two rays coming from the extreme parts of a distant object, and crossing each other in the center F of the glass AB. Then is the angle GFH = IFM that under which the object appears to the naked eye; but IEM = CKD is that under which the image appears as magnified by the eye-glass CD. But the angle IEM is to the angle IFM, as LF to LE, or as the focal distance of the object-glass to the focal distance of the eye-glass; and in that proportion is the object magnified.

There is a defect in all telescopes of this kind, not to be remedied by any means

whatever, which was thought only to arise from hence, *viz.* that spherical glasses do not collect rays to one and the same point; but it was happily discovered by Sir Isaac Newton, that the imperfection of this sort of telescope, so far as it arises from the spherical form of the glasses, bears almost no proportion to that which is owing to the different refrangibility of light. This diversity in the refraction of the rays is about a twenty-eighth part of the whole, so that the object-glass of a telescope cannot collect the rays, which flow from any one point in the object, into a less room than the circular space whose diameter is about the fifty-sixth part of the breadth of the glass. Therefore, since each point of the object will be represented in so large a space, and the centers of those spaces will be contiguous, because the points in the objects the rays flow from are so, it is evident that the image of an object made by such a glass must be a most confused representation, though it does not appear so when viewed through an eye-glass that magnifies in a moderate degree; consequently, the degree of magnifying in an eye-glass must not be too great with respect to that of the object-glass, lest the confusion become sensible. Notwithstanding however this imperfection, a dioptrical telescope may be made to magnify in any given degree, provided it be of sufficient length; for, the greater the focal distance of the object-glass is the less may be the proportion which the focal distance of the eye-glass may bear to that of the object-glass, without rendering the image obscure. Thus an object-glass, whose focal distance is about four feet, will admit of an eye-glass whose focal distance shall be little more than one inch, and, consequently, will magnify almost forty-eight times: but an object-glass of forty feet focus, will admit of an eye-glass of only four inch focus, and will, therefore, magnify 120 times; and an object-glass of an hundred feet focus will admit of an eye-glass of little more than six inch focus, and will therefore magnify almost 200 times.

The reason of this disproportion, in the several degrees of magnifying, is to be explained in the following manner: since the diameters of the spaces, in which rays flowing from the several points of an object are collected, are as the breadth of the object-glass, it is evident that the degree of confusedness in the image is as the breadth of the glass (F)

TELESCOPES.

Fig. 1.

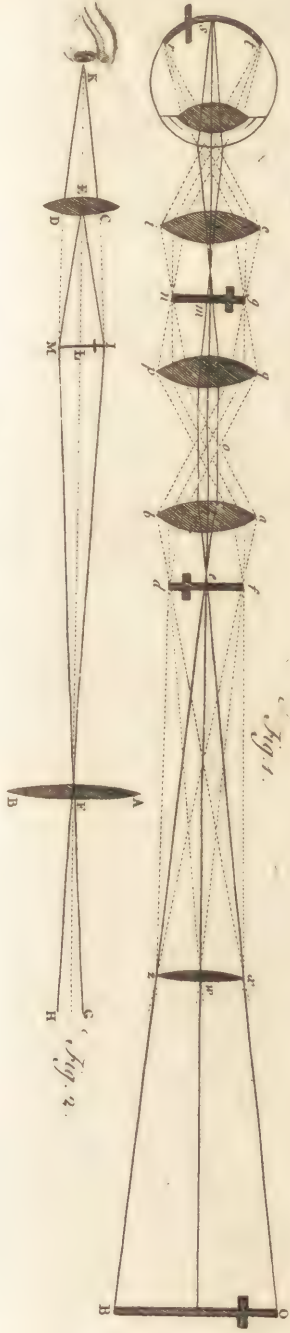


Fig. 2.

Fig. 3.





the degree of confuseness will only be as the diameters or breadths of those spaces, and not as the spaces themselves.) Now the focal length of the eye-glass, that is, its power of magnifying, must be as that degree; for, if it exceeds it, it will render the confuseness sensible; and, therefore, it must be as the breadth or diameter of the object-glass. The diameter of the object-glass, which is as the square root of its aperture or magnitude, must be as the square root of the power of magnifying in the telescope; for, unless the aperture itself be as the power of magnifying, the image will want light: the square root of the power of magnifying, will be as the square root of the focal distance of the object-glass; and, therefore, the focal distance of the eye-glass must be only as the square root of that of the object-glass. So that in making use of an object-glass of a longer focus, suppose than one that is given, you are not obliged to apply an eye-glass of a proportionably longer focus than what would suit the given object-glass, but such a one only whose focal distance shall be to the focal distance of that which will suit the given object-glass, as the square root of the focal length of the object-glass, you make use of, is to the square root of the focal length of the given one. And this is the reason that longer telescopes are capable of magnifying in a greater degree than shorter ones, without rendering the object confused or coloured.

Cata-dioptric, or reflecting TELESCOPE, is the most noble and useful of all others; the mechanism of which is as follows:

A B E H (*ibid.* fig. 3.) is the large tube, or body of the instrument, in which B E is a large reflecting mirror, with a hole in the middle C D. This mirror receives the rays *a c, b d*, coming from the object at a distance, and reflects them converging to its focus *e*, where they cross each other, and form the inverted image I M; *xy* is a small concave mirror, whose focus is at *f*, at a small distance from the image. By this means the rays coming from the image are reflected back through the central hole C D of the large mirror, where they fall on the plano-convex lens W X, and are by it converged to a focus, and there form a second image R S, very large and erect, which is viewed by a meniscus eye-glass Y Z, by the eye at P, through a very small hole in the end of the eye-piece X C D Z.

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If the first lens W X were taken away, the image would be formed somewhat larger at M I; but the area or scope would be less, and therefore the view not so pleasant. At T V is placed a circular piece of brass, with a hole of a proper size to circumscribe the image, and cut off all superfluous or extraneous rays, that so the object may appear as distinct as possible.

As the image is formed by reflection, the rays of every sort will be united nearly in one point, and will therefore admit of an eye-glass Y Z of a deep charge, or small focal distance; and so the power of magnifying will be proportionally increased.

The magnifying power of a reflecting telescope is thus computed. The parallel rays K B (plate CCLXXII. fig. 1.) and L E are reflected by the large object speculum A F to its focus *a*, where the image I M is formed; which image is defined by two other rays N Q, P Q, coming from the extreme parts of the object at a remote distance, and meeting in the center of the large speculum at Q. Now if *f* be the focus of the small mirror G H, supposing the image were formed in the said focus *f* (that is, that both the foci *a* and *f* were coincident) then the rays proceeding from the image I M will proceed parallel after reflection, and produce distinct vision of the image, which will then subtend an angle I O M at the center O of the speculum G H, which is to the angle I Q M, under which the object appears to the naked eye, as *a Q* to *a O* or *f O*. So that the magnifying

power would in this case be as $\frac{aQ}{fO}$.

But, to increase this magnifying power, the image I M is not placed in the focus of the small speculum, but at a small distance beyond it; by which means the rays coming from the image to the speculum G H will be reflected converging to a distant focus R, where a secondary large image I M is formed from the first image I M; which image I M is seen under the same angle I O M with the former from the center of the speculum G H; but from the center of the eye-glass T V it is seen under the large angle I S M. But the angle I S M is to the angle I O M as O R to S R; wherefore the second ratio, or part of the magnifying power, is that of $\frac{OR}{SR}$.

18 H

Conse-

Consequently the whole magnifying power of the telescope is $\frac{aQ}{aO} \times \frac{OR}{SR}$ (because in this case fO becomes aO .) Or, in other words, the angle NQP , under which the object appears to the naked eye, is to the angle ISM , under which the large magnified secondary image IM appears to the eye through the eye-glass, as $\frac{aQ \times OR}{aO \times SR}$.

Such is the theory of the telescope first contrived by Dr. J. Gregory, and therefore called the gregorian telescope; but it received its last improvement from the late Mr. Hadley, and is now in common use.

The machinery for supporting and managing this telescope, is thus described by Dr. Smith, Opt. §. 924. The base of the pedestal ab (*ibid.* fig. 3.) is a thick board a , resting upon four brass feet; one of which being a pin, p , that screws through the board, will make it steady upon any uneven plane: b is a small upright pillar about a foot long, fixed in the board a ; and cd is a brass-arm, that screws into it: de is a short brass-piece that runs round upon the end of the arm cd , and is tightened and stayed by the screw $d:e$ is a hollow socket, with a round brass-ball in it, moveable every way: the neck of this ball is fixed to the middle of the brass-piece fg , which is fixed along the side of the tube hi , by the screws f and g . The eye-glasses are placed in the end l , and the tube is adjusted to various distances by means of the wire hik . When this telescope is used at home, the pedestal ab may be placed upon a table near a window: but when it is used abroad, the pedestal may be left at home: for having made a hole in the side of a tree by the hand-auger m , the wood screw at the end of cd may be screwed into it.

A small alteration was made in the structure of this telescope by Mr. Cassgrain, viz. in using a convex speculum GH (*ibid.* fig. 1.) instead of the concave one GH . Now if they are equally spherical, that is, if they are segments of the same sphere, then will f be also the virtual focus of the convex GH ; and, if all other things remain the same, the first image IM will be virtually the same as before, and the last image IM will be really the same; so that the magnifying power of this form

of the telescope is $\frac{aQ \times OR}{aO \times SR}$, which is equal to that of Gregory's form.

Sir Isaac Newton ordered this telescope to be made in a different form or manner, as follows: $ABCD$ (*ibid.* fig. 2.) was a large octagonal tube or case; EF a large polished speculum, whose focus is at o ; GH a plane speculum truly centered, and fixed at half a right angle with the axis of the large one. Then parallel rays aE , bF , incident on the large speculum EF , instead of being reflected to the focus o , were intercepted by the small plane speculum GH , and by it reflected towards a hole cd in the side of the tube, crossing each other in the point O , which is now the true focal point; and from thence they proceed to an eye-glass ef placed in that hole, whose focal distance is very small, and therefore the power of magnifying may be very great in this form of the telescope; because the image IM is made by one reflection (for that of the plane speculum only alters the course of the rays, and adds nothing to the confusion of the image) and will, for that reason, bear being viewed by a glass of a very deep charge, in comparison of an image formed by differently refrangible rays.

This telescope is a very good one, as to its effect or performance, but it is not so commodious for common use as those of the gregorian form, and is therefore now pretty much laid aside. They who would see a larger account hereof, may consult Sir Isaac's Optics, and several Philosophical Transactions, where he describes it at large, and the reasons which induced him to make choice of this structure rather than that of Dr. Gregory: or see a compendious account of the whole in the last edition of Dr. Gregory's Elements of Optics.

Solar TELESCOPE. This instrument is applied to use in the following manner: AB (*ibid.* fig. 4.) represents a part of the window-shutter of a darkened room, CD the frame, which (by means of a screw) contains the scioptric ball EF , placed in a hole of the said shutter adapted to its size. This ball is perforated with a hole $abcd$ through the middle; on the side bc is screwed into the said hole a piece of wood, and in that is screwed the end of a common refracting telescope GH , IK , with its object-glass G , and one eye-glass at I ; and the tube is drawn out to such a length, as that the focus of each glass may fall near the same point.

This being done, the telescope and ball are moved about in such a manner as to receive

TELESCOPES.

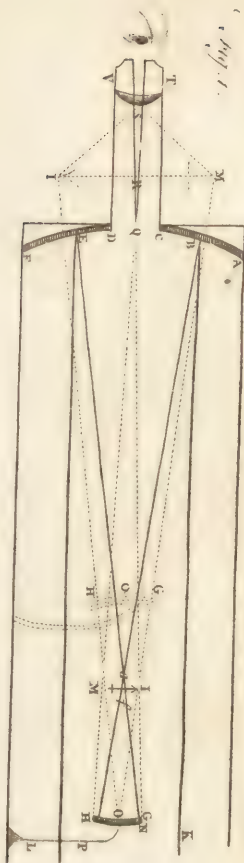


Fig. 1.



Fig. 2.

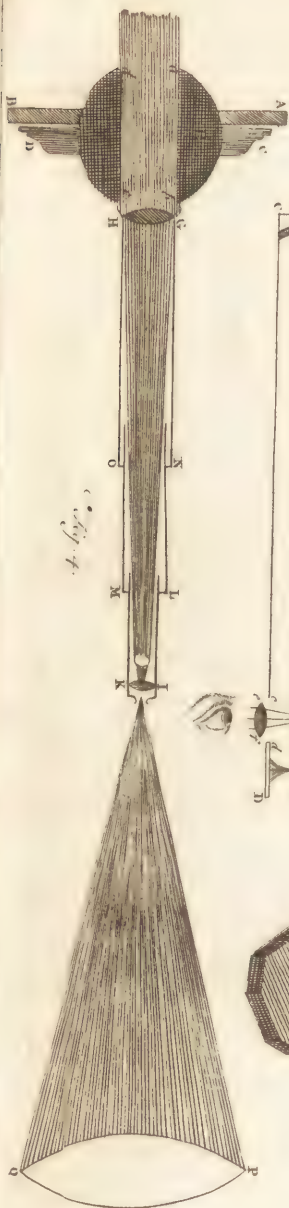


Fig. 3.

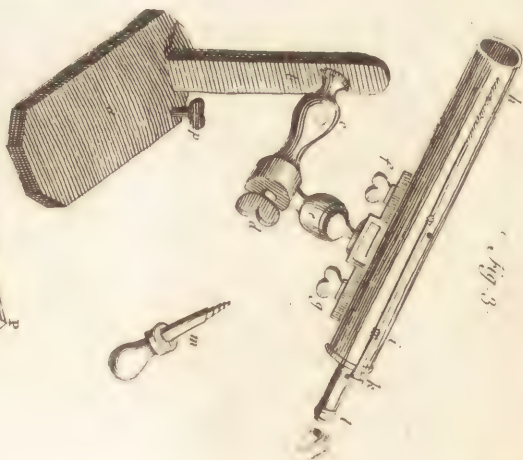


Fig. 4.



TELESCOPES.

Fig. 2.

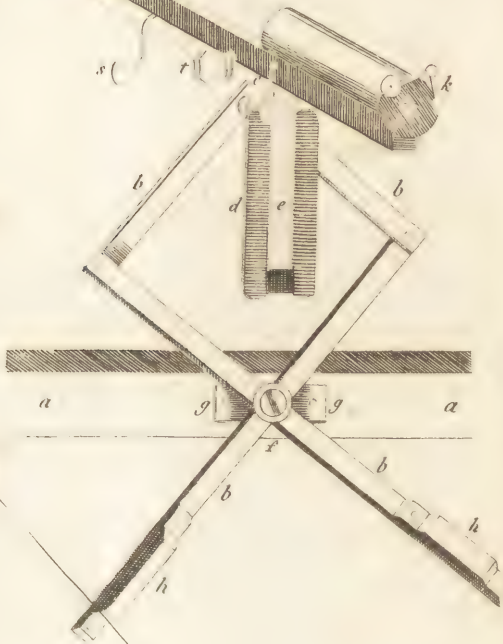
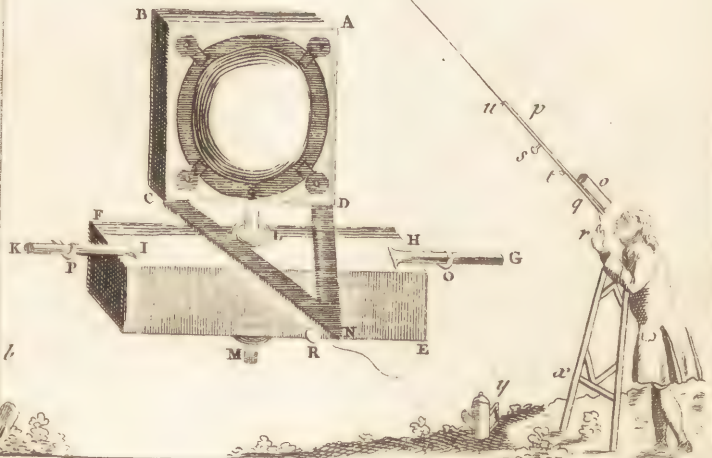


Fig. 1.



Fig. 3.





receive the sun-beams perpendicularly on the lens *G H*, through the cylindric hole of the ball; by this glass they will be collected all in one circular spot *m*, which is the image of the sun. The lens *I K* is to be moved nearer to or farther from the said image *m*, as the distance at which the secondary image of the sun is to be formed requires, which is done by sliding the tube *I K L M* backwards and forwards in the tube *L M N O*. Then of the first image of the sun *m* will be formed a second image *P Q*, very large, luminous, and distinct.

In this manner the sun's face is viewed at any time, without offence to weak eyes; and whatever changes happen therein may be duly observed. The spots (which make so rare an appearance to the naked eye, or through a small telescope in the common way) are here all of them conspicuous, and easy to be observed under all their circumstances of beginning to appear, increase, division of one into many, the uniting of many into one, the magnitude, decrease, abolition, disappearance behind the sun's disk, &c. By the solar telescope, we also view an eclipse of the sun to the best advantage, as having it in our power by this means to represent the sun's face or disk as large as we please, and consequently the eclipse proportionably conspicuous. Also the circle of the sun's disk may be so divided by lines and circles drawn thereon, that the quantity of the eclipse estimated in digits, may this way be most exactly determined: also the moments of the beginning, middle, and end thereof, for finding the longitude of the place: with several other things relating thereto. See the articles *FACULÆ*, *MACULÆ*, *ECLIPSE*, *LONGITUDE*, &c.

The transits of mercury and venus over the face of the sun, are exhibited most delightfully by this instrument. They will here appear truly round, well defined, and very black; their comparative diameters to that of the sun may this way be observed, the direction of their motion, the times of their ingress and egress, with other particulars for determining the parallax and distance of the sun, more nicely than has hitherto been done.

By the solar telescope, you see the clouds most beautifully pass before the face of the sun, exhibiting a curious spectacle according to their various degrees of rarity and density. But the beautiful colours of the clouds surrounding the sun,

and refracting his rays, are best seen in the picture made by the camera-glass. See the article *CAMERA*.

The fine azure of the sky, the intensely strong and various dyes of the margins of clouds, the halo's and corona's, are this way inimitably expressed. And since the prismatic colours of clouds, so variously compounded here, make so noble and delightful a phenomenon, it is surprising that no more regard is had thereto by painters, whole clouds (though near the sun) are seldom or never seen tinged or variegated with those natural taints and colours. See the articles *CLOUD*, *HALO* and *CORONA*.

Aerial Telescope, is a dioptric telescope, used without a tube, in a dark night; for the use of the tube is not only to direct the glasses, but also to make the place dark where the images of objects are formed.

Huygenius contrived a telescope of this kind for viewing the celestial bodies, by fixing the object-glass on the top of a long upright pole, and directing its axis towards any object by means of a silk line coming from the object-glass to the eye-glass below.

We shall here give the description of one of these telescopes. On the top of a long pole, or mast, *ab* (plate *CCLXXIII*. fig. 1.) is fixed a board moveable up and down in the channel *cd*: *e* is a perpendicular arm fixed to it, and *ff* is a transverse board that supports the object-glass inclosed in the tube *i*, which is raised or lowered by means of the silk thread *rl*; *gg* is an endless rope, with a weight *b*, whereby the apparatus of the object-glass is counterpoised; *kl* is a stick fastened to the tube *i*; *m* the ball and socket, by means of which the object-glass is moveable every way; and to keep it steady there is added a weight *n* suspended by a wire; *l* is a short wire, to which the thread *rl* is tied; *o* is the tube which holds the eye-glass; *q* the stick fixed to this tube, *s* a leaden bullet, and *t* a spool to wind the thread on; *u* is pins for the thread to pass through; *x* the rest for the observer to lean upon; and *y* the lantern. In this manner, telescopes have been constructed 123 feet long.

There are several ways of preparing a pole of a proper height, which every workman can readily employ. But as unexperienced persons cannot easily find out and follow an object with this sort of telescope, we shall shew how this may be

TEMPLARS, or TEMPLERS, a religious order instituted at Jerusalem, about the year 1118. Some religious gentlemen put themselves under the government of the patriarch of Jerusalem, renounced property, made the vow of celibacy and obedience, and lived like canons regular. King Baldwin assigned them an apartment in his palace. They had likewise lands given them by the king, the patriarch, and the nobility, for their maintenance. At first there were but nine of this order, and the two principal persons were Hugo de Paganis, and Geoffrey of St. Omers. About nine years after their institution, a rule was drawn up for them, and a white habit assigned them, by pope Honorius II. About twenty years afterwards, in the popedom of Eugenius III. they had red crosses sewed upon their cloaks, as a mark of distinction; and in a short time they were increased to about three hundred, in their convent at Jerusalem. They took the name of Knights Templars, because their first house stood near the temple dedicated to our Saviour, at Jerusalem. This order, after having performed many great exploits against the infidels, became rich and powerful all over Europe; but the knights, abusing their wealth and credit, fell into great disorders and irregularities. Many crimes and enormities being alledged against them, they were prosecuted in France, Italy and Spain; and at last, the pope, by his bull of the 22d of May, 1312, given in the council of Vienna, pronounced the extinction of the order of Templars, and united their estates to the order of St. John of Jerusalem.

TEMPLE, a general name for places of public worship, whether pagan, christian, or otherwise. But the word, in a restrained sense, is used to denote the places, or edifices, in which the pagans offered sacrifice to their false gods. Thus we hear of the Temples of Jupiter, Apollo, Bacchus, &c. They were built and adorned with all possible splendor and magnificence, partly out of respect to the gods, and partly to create an awe and reverence in the worshippers. They were constructed in the manner which was thought most agreeable to the gods, to whom they were dedicated. Thus Jupiter, they thought, took most delight in pillars of the doric order; Bacchus in the ionic; and Vesta in the corinthian:

this rule, however, was not universally or constantly observed. Temples were divided into two parts; the one called *Adytum*, which was the inmost recess of the building, and deemed so sacred, that none but the priests were allowed to enter into it; the other was open, and free to all, who came to pay worship. In the middle of the temples stood the images of the gods, on pedestals, raised above the height of the altar, and inclosed with rails.

Temples, according to the number and difference of their columns, were divided into *tetrastyle*, *prostyle*, *amphiprostyle*, *periptere*, *diptere*, *pseudo-diptere*, *hypæthros*, and *monoptere*, temples. See the article **TETRASTYLE**, &c.

TEMPLES, in anatomy, a double part of the head, reaching from the forehead and eyes to the two ears. See **HEAD**.

TEMPORAL, a term generally used for secular, as a distinction from ecclesiastical. Thus we say temporal lords, and spiritual or ecclesiastical lords.

TEMPORALIS, in anatomy. See the article **CROTAPHITES**.

TEMPORALITIES, the temporal revenues of an ecclesiastic, such as have been annexed to bishops-sees by kings, and other great personages of this land, as they are barons and lords of parliament, such as manors, lands, and lay-fees.

TEMPORUM OSSA. See the article **PETROSA OSSA**.

TENAILLE, in fortification, a kind of outwork, resembling a horn-work, but generally somewhat different, for instead of two demi-bastions, it bears only in front a re-entering angle betwixt the same wings without flanks; and the sides are parallel. See the articles **FORTIFICATION** and **HORN-WORK**.

Tenaille double or flanked, is a work, whose front consists of four faces, making two re-entering angles, and three salient; the wings or sides of this work being in like manner correspondent in the front of the gorge. See the article **GORGE**.

Tenaille simple, a work having its front formed by two faces, which make a re-entering angle, the sides running directly parallel from the head to the gorge.

Tenaille of the place, is that which is comprehended between the points of two neighbouring bastions; that is to say, the curtain, the two flanks that are raised on the curtain, and the two sides of the bastions which face one another;

so that it is the same with what is otherwise called the face of the fortress. See the article **BASTION**, &c.

Tenaille of the foss, is a low work raised before the curtain in the middle of the foss: it is of three sorts; the first is composed of a curtain, two flanks and two faces; the rampart of the curtain, including the parapet and talus, is but five fathom thick, but the rampart of the flanks and faces is seven. The second is composed only of two faces made on the lines of defence, whose rampart and faces are parallel. The third sort differs from the second, only in this, that its rampart is parallel to the curtain of the place. All three sorts are good, and cannot be hurt by the besiegers cannon, till they are masters of the covert way, and have planted their cannon there. See **Foss**. All **tenailles** are defective in this respect, that they are not flanked or defended towards their inward or dead angle; because the height of the parapet hinders seeing down before the angle, so that the enemy can lodge himself there under covert: wherefore **tenailles** are never made but when they want time to make a horn-work.

TENANT, one that holds lands or tenements of some lord, or landlord, by rent, fealty, &c. There are several sorts of tenants, as tenants in fee, tail, for life, years, or at will. There are also joint-tenants, tenants in common. See the article **JOINT-TENANT**, &c.

Tenant to the præcipe, is the person against whom the writ of præcipe is to be brought in suing out a common recovery. See the article **PRÆCIPE**.

TENANT, or **TENAN**, in heraldry. See the article **SUPPORTERS**.

TENAR, in anatomy. See **THENAR**.

TENBURY, a market-town of Worcestershire, fifteen miles north-west of Worcester.

TENBY, a port-town of Pembrokehire, situated on Bristol channel: west long. $4^{\circ} 45'$, north lat. $51^{\circ} 40'$.

TENCH, in ichthyology, the english name of a species of the cyprinus, of a purplish black colour; with an even tail; its length is generally about ten or eleven inches, its breadth about three, and its thickness more than two; but it sometimes grows to an immoderate large size. See the article **CYPRINUS**.

For the method of fishing for tench. See the article **FISHING**.

TENDE, a town of Piedmont, in Italy, twenty-five miles north-east of Nice.

TENDER, in law, signifies carefully to offer, or circumspectly endeavour the performance of a thing; as to tender rent is to offer it at the time and place when and where it ought to be paid, which is done to save the penalty of a bond or obligation, before action is brought thereon. A tender of rent on any part of the land occupied, or at any time of the last day of payment, will save the proviso, or condition for that time, whether the landlord does accept of it or not; and yet though the rent be duly tendered, the landlord may afterwards bring action of debt; but he cannot recover any damages, for in that case the tenant's tender excuses the damages, but does not debar the landlord of his rent; but it must be observed, that a tender of rent made to save forfeiture, must be of the whole rent due without any deduction, on account of the taxes, &c. unless it be so agreed betwixt the landlord and tenant; for stoppage is no payment in law. Where a tender is of money due on a bond, it must be made to the person of the obligee on the day appointed; nevertheless, if the obligor be afterwards sued, he must still pay the money.

TENDER, a small ship, in the service of men of war, for carrying of men, provisions, or any thing else that is necessary.

TENDONS, are white, firm, and tenacious parts, continuous to the muscles, and usually forming their extremities. When the fibres of which they are composed, expand themselves into a membrane, they are called **Aponeuroses**. See the article **MUSCLE**.

Tendo Achillis, is a large tendon, formed by the union of the tendons of the four exterior muscles of the foot; it is so called, because the fatal wound whereby Achilles is said to have been slain, was given there.

TENEBRÆ, an office in the romish church, performed on Wednesday, Thursday, and Friday, in Passion Week, at which time, neither flowers nor images are allowed to be set upon the altars, but they must be covered with purple.

TENEBRIO, the stinking beetle, in natural history, a genus of insects, the antennæ of which are slender, oblong, and filiform; the elytra are joined together, and there are no interior wings.

TENEDOS,

TENEDOS, one of the smallest islands of the Archipelago, situated near the coast of lesser Asia, west of the ruins of Troy, east long. 27° , north lat. $39^{\circ} 30'$.

TENEMENT, properly signifies a house; but in a larger sense it is taken for any house, land, rent, or other thing, which a person holds of another.

TENEMENTARY LANDS, such as are held by the tenant, distinguished by that name from the demesne land of the lord, called inland.

TENEMENTIS LEGATIS, a writ that anciently lay to the city of London, or any other corporation, where, according to the old custom, men might devise tenements, as well as goods and chattels, by their last will, for the determining of any controversy relating thereto, and for rectifying the wrong tenant.

TENENTIBUS IN ASSISA NON ONERANDIS, a writ which lies for the person to whom a disseisor has aliened the land, whereof he disseised another; that he be not arrested on the damages awarded on the assize, if the disseisor has wherewith to satisfy them himself.

TENERIF, one of the largest of the Canary Islands, situated in the Atlantic Ocean: west long. 17° , north lat. 28° , being about 120 miles in circumference. It is a fruitful island abounding in corn, wine and oil, though pretty much incumbered with mountains, of which the most remarkable is that called the pico of Tenerif, being one of the highest mountains in the world, in the form of a sugar-loaf, the white top whereof may be seen at sea, upwards of one hundred miles.

TENES, a province of the kingdom of Algiers, in Africa.

TENESMUS, in medicine, a name given by medical writers, to a complaint which is a continual desire of going to stool, but without any stool being ready to be voided. This is usually attended with some tumour, sometimes with a very considerable one in the part. This is properly no primary disease, but merely a symptomatic one, and differs in degree according to the disease on which it is an attendant. Signs of it are a titillation and itching about the anus, attended with a violent burning pain, and a desire of compressing and voiding something, and this attended usually with no excrement, or only a pulposus or mucous matter, and very often prolapsus ani, or falling down of the rectum. This disease

happens often to people labouring under hæmorrhoidal disorders, especially when the discharges attending them do not succeed regularly, though nature gives all the necessary motions for their excretion. It happens also to people who are subject to void an acrid and bilious matter by stool, and not unfrequently to those who have a stone in the bladder. Women in the latter part of their time in going with child, have also very often terrible fits of it, attended with considerable swelling; this happens to them from the pressing of the uterus with its burden, upon the rectum and hæmorrhoidal veins. The causes of a tenesmus, besides those already mentioned, are the ascarides, a small sort of worms, which usually infest the rectum, and occasion a continual itching and tickling there; the abuse of resinous purging medicines. Much riding will also sometimes occasion it. See **PROLAPSUS, HÆMORRHOID, &c.** As the tenesmus is merely a symptomatic disease, the primary disorder is first to be examined, and treated in order to a cure; thus, when it is occasioned by ascarides, worm medicines are to be given, and clysters of a proper kind injected; and when the worms are by this means destroyed, the tenesmus, which was no more than a symptom, naturally ceases. In general, the regimen and method of cure proper in a tenesmus, are the same with those prescribed in a dysentery; great relief is afforded by a fomentation of warm milk, in which elder flowers have been boiled, as also by a clyster of mutton-broth, or an emollient clyster, in which earth-worms have been boiled. The medicines, at present, generally used for the cure of a tenesmus, are these following: Take of pulvis sanctus and rhubarb, each one scruple; of the oil of cinnamon, one drop; of London laudanum, half a grain; and of the syrup of violets, a sufficient quantity for making into a bolus, to be taken in the morning, and repeated as the situation of the patient requires; at night, a paregoric may be exhibited, and clysters afterwards used; for which purpose, take of whey, or mutton-broth, four ounces; of canary wine, two ounces; of gum arabic, half an ounce; of gum tiagacanth, one dram; and of crude opium, two grains; make into a clyster, to be injected twice or thrice a day, afterwards continue the following medicine for some time: Take of the confesion of Fracastorius, without honey

one scruple; of sperma ceti, fifteen grains; of the species hyacinthæ, japan earth, red coral, and american bole, each eight grains; of the oil of nutmegs, one drop; and syrup of red roses, a sufficient quantity for making a bolus, to be taken twice a day, in a small quantity of the tincture of red roses. In a tensesmus, the last refuge is to opiates.

TENET, or **TENENT**, a particular opinion, dogma, or doctrine, professed by "some divine, philosopher, &c.

TENNE, **TENNY**, or **TAWNY**, in heraldry, a bright colour made of red and yellow mixed; sometimes also called brusk, and expressed in engraving, by thwart, or diagonal strokes or hatches, beginning from the sinister chief, like purple, and marked with the letter T. In the coats of all below the degree of nobles, it is called tenny; but in those of nobles, it is called hyacinth; and in princes coats, the dragon's head. See plate CCLXXIV. fig. 3.

TENON, in building, &c. the square end of a piece of wood, or metal, diminished by one third of its thickness, to be received into a hole in another piece, called a mortise, for the jointing or fastening the two together. It is made in various forms, square, dove-tailed for double mortises, and the like.

TENOR, or **TENOUR**, the purport or content of a writing or instrument in law, &c. An action of debt brought upon a judgment in an inferior court, where the defendant pleads, *nul tiel record*, no such record, a tenor thereof only shall be certified; and it likewise is the same on certioraris. A tenor of a libel has been held to be a transcript of it.

TENOR, or **TENORE**, in music, the first mean, or middle part, or that which is the ordinary pitch of the voice, when neither raised to a treble, or lowered to a bass. The tenor is commonly marked in thorough bass with the letter T. This is that part which almost all grown persons can sing; but as some have a greater compass of voice upwards, others downwards, others are confined to a kind of medium, and others can go equally high or low; hence musicians make a variety of tenors, as a low, a high, a mean, a natural tenor, to which may be added, a violin tenor, &c. for instruments. The Italians usually distinguish two kinds of tenor, *tenore primo*, or 1^o or P^o, which answers to our upper tenor; and *tenore secundo*, 2^o, or II^o, which is our natural

tenor, confounding the counter tenors, &c. under the name of baritono. See the article **BARITONO**, &c.

TENOR, or **TENORISTA**, is also used for a person who sings the tenor part in concert also, for any instrument proper to play it.

TENORE INDICTAMENTI MITTENDO, in law, a writ for the removing of a record of an indictment, and the process thereon out of another court, into the king's-bench. It is usual in these cases to certify the record itself, except it be from London, by virtue of the city charter.

TENORE PRESENTIUM, by the tenor of these presents, in law, is taken for the substance, true intent and meaning of a deed, or other writing. See **DEED**, &c.

TENSE, **TIME**; in grammar, an inflection of verbs, whereby they are made to signify, or distinguish the circumstance of time, in what they affirm. See **VERB**.

There are only three simple tenses or times; the present, as *amo*, I love; the preterit, as *amavi*, I have loved; and the future, as *amabo*, I shall or will love. See the article **PRESENT**, &c.

But, as in the preterit, one may say, that the thing is but just now done; or indefinitely, that it was done; hence, in most languages, there are two sorts of preterits or past tenses; the one definite, which marks the thing to be precisely done, as *I have said*, *I have done*, *I have dined*; the other signifies it done indeterminately, and is for that reason called indefinite, or aorist, as *I wrote*, *I went*, &c. See the article **AORIST**, **IMPERFECT**, **PLUS-QUAMPERFECT**, &c.

TENT, in surgery, a roll of lint worked into the shape of a nail, with a broad flat head. Tents differ in thickness and length, according to the size of the wound for which they are intended, as appears by the figures in plate CCLXXIV. fig. 1. at the letters K, L, M, N. These tents are chiefly used in deep wounds and ulcers. They are of service not only in conveying medicines to the most intimate recesses and sinuses of the wound, but to prevent the lips of the wound from uniting, before it is healed from the bottom; and by their assistance grumous blood, sordes, &c. are readily evacuated. They ought to be made extremely soft, that the cure of the wound may not be retarded by the pain they would otherwise bring on.

There is another kind of tents made of linen-rags not scraped, and worked up

into a conical form, to the basis of which is fastened a long thread; the apex of this tent must be a little unravelled, to make it softer, lest it may become painful: the thread is fastened to the basis, that the tent may be recovered with the greater ease, if, by any accident, it should be forced into the cavity of the thorax or abdomen (*ibid.* letter O); for the tents we now describe, are chiefly used to keep open wounds that penetrate into the cavity of the thorax or abdomen, in order to make way for the proper discharge of blood, matter, &c. There is a third sort of tents, which serve not only to keep open, but to enlarge, by degrees, the mouth of any wound or ulcer, which shall be thought too strait; that, by this means, a free passage may be procured for the blood and matter that were confined, and that proper medicines may find a more ready admittance. These tents are made either of sponge, prepared in a certain manner; or of dried roots of gentian, calamus aromaticus, &c. for their substances imbibe the matter which flows to them, and being presently enlarged dilate the lips of the wound.

TENTER, a machine used in the cloth manufacture, to stretch out the pieces of cloth, stuff, &c. or only to make them even, and set them square.

It is usually about four feet and a half high, and, for length, exceeds that of the longest piece of cloth. It consists of several long pieces of wood, placed like those which form the barriers of a manège; so that the lower cross piece of wood may be raised or lowered, as is found requisite, to be fixed at any height, by means of pins. Along the cross-pieces, both the upper and under one, are hooked nails, called tenter-hooks, driven in from space to space.

TENTERDEN, a market-town of Kent, twenty miles south-west of Canterbury.

TENTHREDO, in natural history, a genus of the hymenoptera class of insects, the female having a serrated point or weapon at the tail: the worm produced of the egg has several feet. The species of this genus have been generally confounded with the ichneumon. See the article **ICHNEUMON**.

TENURE, in law, signifies the manner whereby lands or tenements are held, or the service that the tenant owes to his lord: it likewise denotes the estate in the land. Tenures were antiently divided into the following: *escuage*; that is, land

held by the service of the shield, and therefore by the tenant was, at his own expence, obliged to follow his lord into the wars. Knight's service and chivalry; when lands were held of the king, or mesne-lord, to perform service in war. Burgage tenure; land held of the lord of the borough, at a certain rent. Villenage, otherwise termed base-tenure; whereby the tenant was bound to do all inferior services, commanded by the lord. Grand-serjeanty; lands held by honorary services at the king's coronation. Petit-serjeanty; lands held of the king, to contribute yearly some small thing towards his wars. Frankalmoine; that tenure by which lands were held by ecclesiastics, in free and perpetual alms. Socage-tenure; where lands are held by tenants, to plow their lord's land, and perform other offices of husbandry, at their own expence. But all these antient tenures and services are, in general, taken away, and reduced into common and free socage. The usual tenures at present are, fee-simple; which is an absolute tenure of lands to a man and his heirs for ever. Fee-tail; a limited fee, to a person and the heirs of his body begotten. Curtesy-tenure; where a man having married a woman seised in fee, &c. has issue born alive by her, in which case, after her death, the husband is tenant by the curtesy of England. Tenure in dower; is where a widow holds, for her life, a third part of her husband's land, whereof he was seised in fee at any time during the coverture. There is also a tenure for life, or years, when lands are held for those terms on reserved rents. Copyhold-tenure, is a holding for lives, or in fee, at the will of the lord, according to the custom of the manor.

TEPID, a term used by writers on mineral waters, &c. to express such of them as have a less sensible cold than common water. See **MINERAL WATER**.

TERAMO, a town of Italy, in the kingdom of Naples, and territory of Abruzzo, forty-two miles south of Loretto: east long. 15°, and north lat. 42° 40'.

TERCERA, one of the largest of the Azores or western-islands, situated in the Atlantic ocean: west long. 28°, and north lat. 39°.

TEREBINTHUS, the **TURPENTINE-TREE**. See the article **TURPENTINE**.

TERES, in anatomy, a name given to two muscles of the arm; one is called *teres major*, and is one of the depressor muscles, which has its origin at the lower angle of the

the scapula, and its termination three fingers below the head of the humerus: the other is called *teres minor*, being one of the abductor-muscles, and having its origin at the inferior costa of the scapula; this, together with the *infraspinatus*, properly forms one conjunct muscle, having, at the extremity, only a single tendon, which is inserted into the posterior part of the neck of the humerus.

TERGIFOETUS PLANTS, such as bear their seeds on the backides of their leaves: such are all the capillary plants.

TERGOWISCO, the capital of Wallachia, in european Turkey, eighty miles south-east of Hermanstat in Transilvania: east long. $26^{\circ} 30'$, north lat. $45^{\circ} 35'$.

TERKI, a port-town of Circassia, in Asia, situated on a river of the same name, near the Caspian Sea: east long. 52° , and north lat. $43^{\circ} 40'$.

TERM, *terminus*, in general, signifies much the same with boundary or limit. See **BOUNDARY** and **LIMIT**.

TERM, in law, is generally taken for a limitation of time or estate; as a lease for term of life, or years, which is deemed a chattel real. See **CHATTEL**.

Term, however, is more particularly used for that time wherein our courts of justice are open; in opposition to which, the rest of the year is called vacation. There are four of these terms in a year, *viz.* 1. Hilary-term, which begins on Jan. 23. but if that is a Sunday, the next day, and ends on Feb. 12. 2. Easter-term, which begins the Wednesday fortnight after Easter-day, and ends the Monday next after Ascension-day. 3. Trinity-term, which begins on the first Friday after Trinity-sunday, and ends the Wednesday fortnight after. 4. Michaelmas-term, which begins on Nov. 6. and ends the 28th of the same month.

It has been held, that courts do not sit except in term-time, as to giving of judgments, &c. and in every term there are four days, thus distinguished; that is, the *essoin-day*, the day of exceptions, the day of return of writs, and day of appearance. On the *essoin-day* the term is said to begin, when one judge sits in each of the courts of Westminster, in order to take and enter *essoins*: but it is not till three days afterwards, that all the judges sit for the dispatch of business. There are likewise different returns in different terms, some having more, some fewer: and as, in the king's bench, all returns are to be made on some particular day of the

week in each term, care must be taken not to make the writs out of that court returnable on a non-judicial day, as Sunday, All-saints, &c. See **RETURN**.

Oxford TERMS. Hilary, or lent-term, begins on Jan. 14. and ends the Saturday before Palm-sunday. Easter-term begins the tenth day after Easter, and ends the Thursday before Whit-sunday. Trinity-term begins the Wednesday after Trinity-sunday, and ends after the act, sooner or later, as the vice-chancellor and convocation please. Michaelmas-term begins on Oct. 10. and ends Dec. 17.

Cambridge TERMS. Lent term begins on Jan. 13. and ends the Friday before Palm-sunday. Easter-term begins the Wednesday after Easter-week, and ends the week before Whit-sunday. Trinity-term begins the Wednesday after Trinity-sunday, and ends the Friday after the commencement. Michaelmas-term begins Oct. 10. and ends Dec. 16.

Scottish TERMS. In Scotland, Candlemas-term begins Jan. 23. and ends Feb. 12. Whitsuntide-term begins May 25. and ends June 15. Lammas-term begins July 20. and ends Aug. 8. Martinmas-term begins Nov. 3. and ends Nov. 29.

TERM, in grammar, denotes some word or expression of a language.

TERM in the arts, or **TERM of art**, is a word which, besides the literal and popular meaning which it has, or may have, in common language, bears a further and peculiar meaning in some art or science.

TERM, in logic. A proposition is said to consist of two terms, *i. e.* two principal and essential words, the subject, and the attribute. See **PROPOSITION**.

TERMS of an equation, in algebra, are the several names or members, of which it is composed, and such as have the same unknown letter, but in different powers or degrees: for if the same unknown letter be found in several members in the same degree or power, they shall pass but for one term.

As, in this equation, $xx + ax = bb$; the three terms are xx , ax , and bb .

Moreover, in this, $x^4 + x^3 + x^2 + \frac{ab}{cd}$

$x + \frac{fp}{rs}xy = 0$; the terms are x^4 , x^3 , x^2 , $\frac{ab}{cd} + \frac{fp}{rs}x$, and xy . Where

$\frac{ab}{cd}x$, and $\frac{fp}{rs}x$, are the same terms; and the first term in any equation must be that

where the unknown root hath the highest dimensions; and that term which hath the root in it, of one dimension of power lower, is called the second term, and so on.

TERMS of *proportion*, in mathematics, are such numbers, letters, or quantities, as are compared one with another.

Thus, if $2:4::8:16$, then a, b, c, d ,
 $a.b::c:d$, are called the terms; a being the first term, b the second term, &c.

TERMS, or **COURSES**, in medicine, the menses, or women's monthly purgations. See the article **MENSES**.

TERMINALIA, in antiquity, feasts celebrated by the Romans, in honour of the god **Terminus**.

Varro is of opinion this feast took its name from its being at the term or end of the year; but Festus is of a different sentiment, and derives it from the name of the deity in whose honour it was held.

TERMINATION, *terminatio*, in grammar, the ending of a word, or last syllable thereof. See **WORD** and **SYLLABLE**. It is the different termination of one and the same words on different occasions, that constitute the different cases, numbers, tenses, and moods, &c. See the articles **CASE**, **NUMBER**, &c.

TERMINI, or **TERMOLÉ**, a town of the province of Capitanate, in the kingdom of Naples, seventy miles north-east of the city of Naples.

TERNATE, the most northerly of the Molucca or Clove-islands, in the possession of the Dutch.

TERNATEA, in botany, a plant, otherwise called clitoria. See **CLITORIA**.

TERNI, a town of Italy, subject to the pope, forty-six miles north-east of Rome.

TERRA, **EARTH**, in geography and astronomy. See the article **EARTH**.

TERRA FIRMA, in geography, is sometimes used for a continent, in contradistinction to islands.

Thus Asia, the Indies, and South America, are usually distinguished into terra firmas and islands.

TERRA A TERRA. Gallies, and other vessels are said to go terra a terra, when they never go far from the coasts.

The phrase is also applied, in the manege, to horses which neither make curvets nor balotades, but run smoothly on the ground, on a pressed gallop, only making little leaps or risings with the fore feet.

TERRA DEL FOGO, an island of South-

America, from which it is separated by the streights of Magellan.

TERRÆ FILIUS, SON OF THE EARTH, a student of the university of Oxford, formerly appointed, in public acts, to make jesting and satirical speeches against the members thereof, to tax them with any growing corruptions, &c.

TERRACE, or **TERRAS**, a walk or bank of earth, raised in a garden or court, to a due elevation, for a prospect.

TERRACE is also applied to the roofs of houses that are flat, and whereon one may walk; as also to balconies that project.

TERRACINA, a town of the Campania of Rome, in Italy, seventeen miles north-west of Gaieta.

TERRAQUEOUS, in geography, an appellation given to our globe, because consisting of land and water. See the articles **EARTH** and **SEA**.

TERRE-PLEIN, in fortification, denotes the horizontal superficies, or top, of the rampart, between the inferior talus and the banquette. It is thus called, as lying nearly level, with only a little slope inwardly, to bear the recoil of the cannon. See the article **RAMPART**.

TERRE-TENANT, in law, the person who hath the actual possession of the land: thus, if a freeholder lets out his freehold to another, to be possessed and occupied by him, this person is called the terre-tenant. See the article **TENANT**.

TERRELLA, *munson*, an appellation given to a load-stone, when turned into a spherical figure, and is placed so, that its poles and equator, &c. correspond to the poles and equator of the world; as being a just representation of the great magnetical globe which we inhabit. See the article **MAGNET**.

Such a terrella, if nicely poised and placed in a meridian, it was imagined, would turn about its axis once in twenty-four hours; but experience has shewed this to be a mistake.

TERRESTRIAL, something partaking of the nature of earth, or belonging to the globe of the earth: thus we say, the terrestrial globe, line, &c. See the articles **GLOBE**, **EARTH**, **LINE**, &c.

TERRIER, a book, or roll, wherein the several lands, either of a private person, or of a town, college, church, &c. are described. It should contain the number of acres, and the site, boundaries, tenants names, &c. of each piece or parcel.

TERRIER is also used for a small hound, to hunt the fox or badger; so called, because

because he creeps into the ground, as the ferrets do into the coney-burrows, after the fox, &c. See HUNTING.

TERRING, a market-town of Suffex, situated on the English channel, twenty miles east of Chichester.

TERRIS, BONIS, ET CATALIS RETRAHENDIS, &c. a writ which lies for a clerk, to recover his lands, goods, and chattels, formerly seized, after clearing himself of a felony.

TERRIS ET CATALIS RETENTIS ULTRA DEBITUM LEVATUM, a judicial writ brought for restoring of lands or goods to a debtor, that is distrained above the amount of the debt due.

TERRIS LIBERANDIS, a writ that lies for a person convicted on an attain, to bring the process before the king, and to take a fine for his imprisonment, to deliver him his lands again, and release him of the strip and waste.

TERRITORY, in geography, denotes an extent or compass of land, within the bounds, or belonging to the jurisdiction, of any state, city, or other subdivision of a country.

TERROUEN, a town of Artois, in the french Netherlands, situated on the river Lis, six miles south of St. Omers.

TERTIAN, in medicine, an ague, or intermitting fever, the fits of which return every third day; that is, there are two fits in three days, the day intervening being without any fit at all.

A regular tertian is attended with the following symptoms: at first, the head aches, the limbs seem weary, there is a pain in the loins about the first vertebrae of the back, which tends towards the epigastrium, with a painful sensation of a tension in the hypochondria, and costiveness: then comes on a coldness of the external parts, especially of the nose and ears, a stretching, yawning, shivering, and shaking, sometimes so much as to make the bed tremble under them; the pulse is small, contracted, and weak; sometimes the patient is troubled with thirst; then follows a nausea, with a fruitless reaching to vomit: and to these symptoms there succeeds an anxious burning and dry heat, which pervades the whole body; the pulse becomes full and quick, the restlessness increases, the breathing is more difficult, and the patient, with his eyes almost closed, begins to talk a little wildly. However, the duration of the fit is uncertain, continuing

sometimes ten or eleven hours, and sometimes twenty-four.

As to the method of cure, it differs but little from that recommended for quartans. See the articles **QUARTAN** and **INTERMITTENT**.

TERTIATE a great gun, in gunnery, is to examine the thickness of the metal at the muzzle, whereby to judge of the strength of the piece, and whether it be sufficiently fortified or not. This is usually done with a pair of caliber-compasses, and if the piece be home-bored, the diameter less by the height, divided by 2, is the thickness at any place.

TERVEL, a city of Arragon, in Spain, situated on the river Guadalavira, seventy-five miles south of Sarragossa: west long. 1° 20', north lat. 40° 35'.

TERVERE, a port town of the united Netherlands, situated on the north-east coast of the island of Walcheren, four miles north-east of Middleburg.

TERUNCIVS, in roman antiquity, a very small brass-coin. See **COIN**.

TESCHIN, a city of Silesia, twenty-five miles south-east of Troppau: east long. 18°, and north lat. 49° 50'.

TESSELATED PAVEMENTS, those of rich mosaic work, made of curious square marbles, bricks, or tiles, called tessellæ, from their resembling dice. See **MOSAIC**.

TESSIN, a river of Italy, which, taking its rise in the Alps, runs through the country of the Grisons and the lake Maggiore; and then, turning south-east thro' the Milanese, passes by Pavia, and falls into the Po, a little below that city.

TEST, in metallurgy, a vessel of the nature of the coppel, used for large quantities of metals at once. See **COPPEL**.

Tests are usually a foot and a half broad, and are made of wood-ashes, not prepared with so much care as for coppel-making, and mixed with finely powdered brick-dust; these are made into the proper shape either by means of an earthen vessel of proper dimensions, or only an iron-ring. To make them in the first manner, an earthen vessel is to be procured, not glazed within, and by its depth and breadth proportioned to the quantity of metal to be worked: the inside of this vessel is to be well moistened with fair water, that the ashes to be put into it may adhere the better. Put into this vessel, thus prepared, the ashes and brick-dust before-mentioned, and first moistened either with water alone, or with water with a little white

white of an egg mixed in it: let the quantity of this be so much as will half fill the vessel, then press the mass with a wooden indented pestle; or, if not for a very large test, with a wooden cylinder only of an inch thick: when thus pressed down add fresh ashes, and press them in a second time, as in the making of coppels, and repeat this addition of fresh ashes till the earthen vessel is nearly full; then remove the superfluous ashes with an iron-ruler, and let the inequalities remaining at the border, be smoothed with a wooden ball rolled round about. This done, you are to cut the cavity with a bowed iron, that you may have a broad spherical segment, not very deep: and lastly, by means of a sieve, strew this cavity carefully and regularly over with dry ashes of bones of animals, ground extremely fine, and squeeze these hard in, by the rotation of the wooden ball. Thus you have a test finished, which, together with its earthen pot, must be set in a dry warm place.

To make the tests in the other manner, or by means of an iron-ring; let a ring of that metal be filled with ashes, mixed with brick-dust, and moistened as before-mentioned, in such manner that they may rise considerably above the ring; then press them strongly, either with your hands, or with an indented pestle, and afterwards, with gentle blows of a rammer, press the ashes from the circumference towards the center, in a spiral line and that in such a manner, that, after having been sufficiently pressed, they may be a small matter higher than the brink of the ring. If there are now any vacancies in the mass, empty the ring, and fill it again with more ashes; for if you should attempt to fill up these by adding, were it but ever so little ashes, the second or additional quantities, will never cohere so firmly with the first, but that they may probably separate in the operation. This done, turn the ring upside down, and on the other side, or bottom, take out the ashes to the quantity of one third part of the depth of the ring; and again fill the vacancy with the same ashes, in such a manner that there may remain no sensible cavity. When the mass is thus prepared, cut out a cavity in the larger surface of the ring, with a bowed iron, as in the former method.

TEST LIQUOR, a liquor used by dealers in brandies, to prove whether they be genuine, or mixed with home-spirits.

This liquor is nothing but a green or white vitriol, dissolved in fair water; for a few drops of it being let fall into a glass of old french brandy, will turn the whole to a purple, or fine violet colour; and by the strength or paleness of this colour, the dealers judge the brandy to be genuine or mixed, in different proportions, with home-spirits.

The people who use this liquor, place great confidence in it; but it is really a very vague and uncertain thing; for old french brandy, having long lain in the cask, takes a dilute tincture of the wood of the cask, that is, of oak; and this being of the same nature with a solution of tincture of galls, naturally turns bluish or blackish with vitriol. A new distilled brandy, though wholly foreign, would not give this test; and a common malt spirit, with oak-chips infused in it, will turn as dark as the finest brandy. While our distillers, indeed, had nothing in use for the colouring their spirits but burnt sugar, it was possible to make some guess at an adulteration with them, because the brandy, in this case, would not become blackish in proportion to its former colour, the sugar colour not turning to ink with the vitriol, like the other: but our distillers have of late found a way of using an extract of oak, for the colouring of their spirits; and, since that, this test liquor is of very little use, our common spirits, of any kind, turning as deep with it as the foreign brandies.

The very best way of making this test liquor, is with a calcined vitriol of iron dissolved in a dilute or aqueous mineral acid. The liquor, when well made in this manner, is of a fine yellow colour and will give, for a time, the finest blue to any spirituous tincture of oak.

TEST-ACT, a statute 25 Car. II. cap. 12. which requires all officers, both civil and military, to take the oaths and test, *viz.* the sacrament, according to the rites and ceremonies of the church of England for the neglect whereof, a person executing any office, mentioned in that statute forfeits the sum of 500*l.* recoverable by action of debt.

TESTACEOUS, in natural history, an epithet given to a species of fish, which are covered with a strong thick shell, tortoises, cyfers, pearl-fish, &c. In strictness, however, testaceous is only applied to fish whose strong and thick shells are entire and of a piece: the which are soft, thin, and consist of sev-

ral pieces jointed, as the lobster, &c. being called crustaceous.

But, in medicine, all preparations of shells and substances of the like kind, are called testaceous powders: such are powder of crab's claws and eyes, hartshorn, pearl, &c. Dr. Quincy and others suppose the virtue of all testaceous medicines to be alike; that they seldom or never enter into the lacteals, but that the chief of their action is in the first passages; in which case they are of great use in absorbing acidities.

Hence they become of use in fevers, and especially in rectifying the many distempers in children, which generally owe their origin to such acidities.

TESTAMENT, *testamentum*, in law, a solemn and authentic act, whereby a person declares his will, as to the disposal of his estate, effects, burial, &c. See the article **WILL**.

There are two sorts of testaments, *viz.* one in writing, and one in words; which last is called a nuncupative testament, or will; but this is not good in case of lands, which are only deviseable by a testament in writing, executed in the lifetime of the testator.

TESTATOR, or **TESTATRIX**, the person who makes his or her will and testament.

TESTATUM, in law, a writ in personal actions, where, if the defendant cannot be arrested on a *capias*, in the county where the action is laid, but is returned non est inventus by the sheriff, this writ shall be sent into any other county, where such person is thought to be, or have wherewithal to satisfy the demand.

It is called testatum, because the sheriff has, before, testified that the defendant was not to be found in his bailiwick.

TESTE, in law, a word generally used in the conclusion of every writ, wherein the date is contained, and begins with *teste meipso*, &c. in case it be an original writ; or, if only judicial, then with *teste*, naming the chief justice of the bench whence the writ issues.

TESTES, the **TESTICLES**, in anatomy. See the article **TESTICLE**.

The testes of the brain are two little, round, hard bodies, between the third and fourth ventricle, near the pineal gland. See the article **BRAIN**.

TESTICLE, *testis*, in anatomy, a double part in male animals, serving for generation. See **GENERATION**.

The testicles are two in number, of an

oval or egg-like figure, and are contained in a peculiar bag, called the **scrotum**. See the article **SCROTUM**.

But besides this external covering, the testicles themselves have their coats or tunics; the first of which composes the cremaster-muscle, the office whereof is to raise the testicle; the second is the vaginalis tunica, formed of a process of the peritonæum, and laxly surrounds the testicle; the third is the tunica albuginea, which is robust and strong, and adheres closely to the substance of the testicle; this last receives the spermatic vessels, and conveys them to the testicle.

The substance of the testicles is vasculous, being composed of a great number of extremely minute vessels, called *vascula seminalia*; which are convoluted together in the manner of the intestines, and appear beautifully after macerating the testicles in vinegar. There is also a body, called, from the discoverer, *corpus Highmori*, wherein there is a cavity for the reception of the semen: this, in human subjects, is placed in the back of the testicle; but in dogs, and many other animals, it is in the middle of the testicle.

The vessels of the testicles are otherwise called spermatics. See **SPERMATIC**.

As to the use of the testicles, it is to produce the semen masculinum, for the purpose of generation. See the articles **SEMEN** and **GENERATION**.

Some also give the name female testicles, *testes muliebres*, to the ovaries of women. See the article **OVARIES**.

Tumours of the TESTICLES. When these happen from any external injury, the best application to disperse them, says Heister, are vinegar of litharge, lime-water, spirit of wine-camphorated, and ceruss, tully, or lapis calaminaris mixed in it: but in the night-time, when the applications of fomentations are not so convenient, a plaster of the mercurial kind, doubly sated with mercury; or, in slight cases, one of simple diachylon, may very properly be kept on. Internal medicines, such as nitre, and the thin decoctions of discutient medicines, are also to be used; and, if occasion call for it, bleeding in the arm is very proper.

This may be the method with tumours of these parts, from external injuries; but when they are from venereal causes, it is always necessary to give brisk purges, with the addition of a proper dose of calomel to each; and warm and weak drinks

drinks should be taken frequently, by which means these tumours are often dispersed. See GONORRHOEA and POX.

But if either remedies are applied too late, or the inflammation is too violent, the tumour generally ends either in a suppuration or gangrene. In this case the maturing remedies are to be applied, such as warm cataplasms, and the like; and if the tumour does not break of itself at a proper time, from the application of these, it must be carefully opened with the knife, and the matter being discharged, the wound is to be cleansed by injecting vulnerary decoctions, and afterwards healed with balsam of Peru, or the like.

TESTICULATED, among botanists, an appellation given to roots composed of two tuberosc knobs, resembling testicles; such are those of orchis, &c.

TESTIMONIAL, a kind of certificate, signed either by the master and a fellow of the college where the person last resided; or by three, at least, reverend divines, who knew him well for three years last past, giving an account of the virtues, uniformity, and learning of the person.

Testimonial is also a certificate, under the hand of a justice of peace, testifying the place and time when a soldier, or mariner landed, and the place of his dwelling; &c. whither he is to pass.

There is also another kind of testimonial for the clergy, made by persons present, that a clergyman has in all things complied with the act of uniformity; and to certify, that the clerk has performed what the law requires on his institution and induction.

TESTIMONY, the same with evidence. See the articles EVIDENCE, WITNESS, and CERTITUDE.

TESTUDO, in zoology, a genus of amphibious animals, with four legs and a tail, and the body covered with a firm shell.

This genus comprehends all those animals known in english by the names of tortoises and turtles; of which there are a great many species, some with four toes on each foot; others with five toes on the fore feet, and four on the hinder ones; and others, distinguished by other peculiarities, particularly the compartments of their shells, some being divided into irregular spaces, and others beautifully tessellated. See plate CCLXXIV. fig. 2. n^o 1. and 2.

The shells of these animals are much used in ornamental works, under the name of

tortoise-shells; which, on importation, pay a duty of 1s. $\frac{92\frac{1}{2}}{100}$ d. the pound; and, on exportation, draw back, 1s. $\frac{64\frac{1}{2}}{100}$ d.

The turtle, whose flesh is so finely flavoured, and so much esteemed at table, is caught in great abundance in the american seas; and grows to a vast size, some having been found to weigh 480 pounds.

The Americans find so good account in catching turtle, that they have made themselves very expert at it: they watch them from their nests on shore, in moonlight nights; and, before they reach the sea, turn them on their backs, and leave them till morning; when they are sure to find them, since they are utterly unable to recover their former posture: at other times they hunt them in boats, with a peculiar kind of spear, striking them with it through the shell; and as there is a cord fastened to the spear, they are taken much in the same manner as the whales. See the article FISHERY.

TESTUDO, in antiquity, was particularly used among the poets, &c. for the ancient lyre; by reason it was originally made by its inventor, Mercury, of the black or hollow shell of the testudo aquatica, or sea-tortoise, which he accidentally found on the banks of the river Nile. See the article LYRE.

TESTUDO, in the military art of the ancients, was a kind of cover or screen which the soldiers, *e. gr.* a whole company, made themselves of their bucklers, by holding them up over their heads, and standing close to each other. This expedient served to shelter them from darts, stones, &c. thrown upon them, especially those thrown from above, when they went to the assault.

TESTUDO was also a kind of large wooden tower which moved on several wheels and was covered with bullocks-hide spread, serving to shelter the soldiers when they approached the walls to mine them or to batter them with rams. It was called testudo, from the strength of its roof, which covered the workmen as the shell does the tortoise.

TESTUDO veliformis quadrabilis, a hemispherical vault, or ceiling of a church wherein four windows are so contrived as that the rest of the vault is quadrable or may be squared. See VAULT.

The determining of those windows was a problem proposed to the great mathematician



ticians in Europe, particularly the cultivators of the new calculus differentialis in the *Acta Eruditorum Lipsiæ*, by Sig. Viviani, under the fictitious name of A. D. pio lisci pusillo geometra, which was the anagram of postermo Galilæi discipulo.

It was solved by several persons, particularly Mr. Leibnitz, the very day he saw it; and he gave it in the *Leipscic acts* in an infinity of manners; as also did M. Bernouilli, the marquis de l'Hospital, Dr. Wallis, and Dr. Gregory.

TETANUS, in medicine, is a convulsive motion that makes any part rigid and inflexible. See **CONVULSION**.

TETBURY, a market town, sixteen miles south of Gloucester.

TETHYS, in ichthyology, a genus of fish of the order of the zoophytæ, the body of which is formed as it were of two lips of an oblong cartilaginous body; between them there are four tentacula, which have the form of ears, and two perforations in most species near the tentacula.

TETICACO, a great lake of Peru, more than two hundred miles in circumference: the towns situated on this lake are esteemed the most delightful in all South America.

TETRACERA, in botany, a genus of the polyandria-tetragynia class of plants, without any flower petal: the fruit is composed of four oval capsules, formed each of a single valve, opening by a suture in the upper part, and containing only one cell, with numerous, roundish, and covered seeds.

TETRACHORD, in the antient music, a concord consisting of four degrees or intervals, and four terms or sounds; called also by the antients diatessaron, and by us a fourth. See **INTERVAL**, **DIAGRAM**, **DIATESSARON**, and **FOURTH**.

This interval had the name tetrachord given it, with respect to the lyre and its chords or strings.

TETRADECARHOMBIS, in natural history, the name of a genus of fossils, of the class of the selenitæ, expressing a rhomboidal body, consisting of fourteen planes. See the article **SULENITÆ**.

The characters of this genus are, that the bodies of it are exactly of the same form with the common selenitæ; but that in these each of the end-planes is divided into two, and there are, by this mean, eight of these planes instead of four. Of this genus there are only three

known species. 1. A thin, pellucid one, with transverse filaments, which is frequent in the clay-pits of Northamptonshire, and some other counties. 2. A dull, thicker kind, with very slender, transverse filaments: this is a very rare species, and found, as far as is yet known, only in Leicestershire in the yellow brick-clay, and at small depths. And, 3. A large scaly kind, considerably long, and of a very rough surface: this is found in Yorkshire, and that sometimes loose, on the sides of the hills, but more frequently buried in the strata of clay.

TETRADIAPASON, a musical chord, otherwise called a quadruple diapason, or eighth. See the article **DIAPASON**.

TETRADITÆ, a name given to several different sects of heretics. The sabbathians were called tetraditæ, from their keeping Easter-day on the fourth day, or on Wednesday. The manichees, and others who admitted of a quaternity instead of a trinity in the Godhead, were also called tetraditæ. The followers of Petrus Fulensis had the same appellation, by reason of the addition they made to the trisagion, to support an error they held, that in our saviour's passion it was not any particular person of the Godhead that suffered; but the whole deity.

TETRADYNAMIA, in botany, a class of plants, whose flowers have four of their stamina of more efficacy than the rest: these are always known by having the four efficacious stamina longer than the rest. The tetradynamia of Linnæus include those called by Tournefort cruciformes, and by Ray, siliquosæ, and siliculosæ.

The general characters of which are these: the perianthium is of an oblong figure, and is composed of four leaves, which are oval, oblong, hollow, obtuse, and converging toward one another, and are gibbous at the base; these all fall off with the flower, and stand in pairs; the opposite ones being always equal in length, this cup is properly the nectarium of the plant, and it is on this occasion that it is gibbous at the base. The flower is of that kind, called by Tournefort, cruciform; it consists of four equal petals, which have ungues of the length of the cup, erect, and flat; the petals are broad at the top, and obtuse, and scarce touch one another at the sides; and the insertion of the petals and of the stamina is in the same place.

The stamina are six subulated erect filaments, the two opposite ones are of the

length of the cup, the other four are something longer; and are of a less length however than the petals. The antheræ are oblong and pointed, thick at the base and erect, with apices bending sideways. The nectariferous gland in the different genera of this class, is differently situated. It usually, however, is found near the stamina, and most frequently of all is affixed to some short filaments, and stands near their base. Two of the stamina are often curved, that they may not press upon this gland; and it is often owing to this, that two are shorter than the rest. The germen of the pistil is placed above the receptacle, and is every day in its growth raised higher and higher. The style is sometimes wanting, but in such plants as have it, it is of the length of the longer stamina. The stigma is always obtuse.

The fruit or capsule is always a bivalve pod, which often contains two cells; this, when ripe, opens by splitting from the apex to the base, and it has always a little membranous substance serving within as a septum, when the pod is bilocular; this stands out beyond the apex, and is the rudiments of what was before the style. The seeds are roundish, and the pod usually narrow and oblong.

This is a very natural class of plants, and has been received as such under whatever name by all the systematical writers in botany: and the plants contained under it are generally supposed to be all antiscorbutics.

It is naturally subdivided into two series; the one containing the siliculose plants, and the other the siliquose: the first have a short pod, the others a long and slender one: the first pods usually have more of the remains of the style than the others.

TETRAEDRON, or **TETRAHEDRON**, in geometry, one of the five regular or platonic bodies or solids, comprehended under four equilateral and equal triangles. See plate CCLXXV. fig. 3.

It is demonstrated by mathematicians, that the square of the side of a tetraedron is to the square of the diameter of a sphere, wherein it may be inscribed, in a subsequalteral ratio: whence it follows, that the side of a tetraedron is to the diameter of a sphere it is inscribed in, as $\sqrt{2}$ to the $\sqrt{3}$, consequently they are incommensurable.

TETRAGON, in geometry, a general name for any four-sided figure, as a square,

parallelogram, rhombus, or trapezium. See PARALLELOGRAM, &c.

TETRAGON, in astrology, an aspect of two planets with regard to the earth, more usually called quartile. See the article QUARTILE.

TETRAGONIA, in botany, a genus of the icosandria-tetragynia class of plants, without any corolla: the fruit is a coriaceous crust, formed into a sort of square figure by four longitudinal alæ, and contains a single osseous seed with four cells.

TETRAGONOTHECA, in botany, a genus of the syngenesia-polygamia-superflua class of plants, with a compound radiated flower, a paleaceous receptacle, and no down to the seeds.

TETRAGONIAS, a name given to a meteor, whose head is of a quadrangular figure, and its tail or train long, thick, and uniform.

TETRAGONISM, in geometry, a term used by some for the quadrature of a circle.

TRRAGONUS, in anatomy, a muscle otherwise called quadratus genæ. See the article QUADRATUS.

TETRAGRAMMATON, a denomination given by the Greeks to the hebrew name of God, Jehovah, because consisting of four letters.

TETRAMETER, in antient poetry, an iambic verse, consisting of four measures, or eight feet. This kind of verse is only found in the comic poets, as Terence, &c. See the article IAMBIC.

TETRANDRIA, in the Linnæan system of botany, a class of plants, the fourth in order; comprehending all such plants as have hermaphrodite flowers, with four stamina, or male-parts, in each. See the article BOTANY.

TETRAO, in ornithology, a genus of birds, of the order of the gallinæ, distinguished by having the part of the forehead over the eyes naked and papillose.

This genus comprehends the urogallus major, or wood-cock; the urogallus minor, or grouse; the moor-cock, lagopus &c. See UROGALLUS, &c.

TETRAHEDRON, or **TETRAEDRON**. See the article TETRAEDRON.

TETRAPETALOUS, in botany, an epithet given to flowers that consist of four single petala or leaves, placed around the pistil. See the article PISTIL.

TETRAPHARMACUM, signifies an remedy consisting of four ingredients.

TETRA

TETRAPLA, in church history, a bible disposed by Origen under four columns, in each whereof was a different greek version, *viz.* that of Aquila, that of Symmachus, that of the Seventy, and that of Theodotion. See **BIBLE**.

TETRAPTERA, in the history of insects, a name given to that order of insects, which have four wings. See the article **INSECT**.

The insects of this order are very numerous, and have certain evident distinctions in the structure of their wings, and are thence arranged under five classes; *viz.* the coleoptera, scleroptera, neurop-tera, lepidoptera, and hynenoptera. See the article **COLEOPTERA**, &c.

TETRAPTOTE, *tetraptoton*, in grammar, a name given to such defective nouns as have only four cases; such are *viciis*, *pecudis*, *fordis*, &c. as being deprived of the nominative and vocative singular.

TETRAPYRAMIDIA, in natural history, the name of a genus of spars, influenced in their shape by an admixture of particles of tin, and found in form of broad-bottomed pyramids of four sides. See the article **SPAR**.

Of this genus there is only one known species, which is usually of a brownish colour, and found in Saxony, as also in Devonshire, Cornwall, and other counties of England, where there is tin.

TETRARCH, *tetrarcha*, a prince who holds and governs a fourth part of a kingdom. Such originally was the import of the title tetrarch; but it was afterwards applied to any petty king or sovereign, and became synonymous with ethnarch.

TETRASTICH, a stanza, epigram or poem, consisting of four verses.

TETRASTYLE, in the antient architecture, a building, and particularly a temple, with four columns in its front.

TETRASYLLABICAL, a word consisting of four syllables.

TETRATONON, in music, a name whereby the superfluous fifth is sometimes, called, as containing four tones.

TETUAN, a town of the empire of Morocco, situated about eight miles from the bay of that name, just within the straits of Gibraltar: west long. 6° 35', north lat. 35° 40'.

TEUCRIUM, in botany, a genus of the didynamia-gymnospermia class of plants, the corolla whereof is ringent, and formed of a single petal: the tube is cylindric and short, and terminates in an incur-

vated opening: the lower lip is divided into three segments; the lateral ones are of the figure of the upper lip, and somewhat erect; the middle one is much larger and rounded: there is no pericarpium; the seeds are four, roundish, and lodged in the base of the cup.

This genus comprehends the germander, polium, scordium, &c. This plant has the credit of being a great sudorific and alexipharmic. It is prescribed in malignant and pestilential fevers, and in the plague itself, as also in obstructions of the liver and spleen; it is said to destroy worms externally; it cleanses ulcers, and is applied by way of cataplasm to mitigate pain; it is at present chiefly used in the shops as an ingredient in the confectio Fracastorii.

TEUTONIC, something belonging to the Teutons, an antient people of Germany, inhabiting chiefly along the coasts of the German ocean: thus, the teutonic language is the antient language of Germany, which is ranked among the mother tongues. The teutonic is now called the German or Dutch, and is distinguished into upper and lower. The upper has two notable dialects, *viz.* 1. The Scandian, Danish, or perhaps Gothic; to which belong the languages spoken in Denmark, Norway, Sweden, and Iceland. 2. The Saxon, to which belong the several languages of the English, Scots, Frisian, and those on the north of the Elbe. To the lower belong the Low Dutch, Flemish, &c. spoken through the Netherlands, &c.

TEUTONIC ORDER, a military order of knights, established towards the close of the twelfth century, and thus called as consisting chiefly of Germans or Teutons. The origin, &c. of the teutonic order is said to be this. The Christians, under Guy of Lusignan, laying siege to Acre, or Acon, a city of Syria, on the borders of the Holy Land, some Germans of Bremen and Lubec, touched with compassion for the sick and wounded of the army, who wanted common necessities, set on foot a kind of hospital under a tent, which they made of a ship's sail, and here betook themselves to a charitable attendance on them. This started a thought of establishing a third military order, in imitation of the templars and hospitallers. The design was approved of by the patriarch of Jerusalem, the archbishops and bishops of the neighbouring places, the king of Jerusalem, the masters of the

temple and hospital, and the german lords and prelates then in the Holy Land, and pope Calixtus III. confirmed it by his bull, and the new order was called the order of teutonic knights of the house of St. Mary at Jerusalem. The pope granted them all the privileges of the templars and hospitalers of St. John, excepting that they were to be subject to the patriarchs and other prelates, and that they should pay tythe of what they possessed. Others relate, that the teutonic order was established at Jerusalem, before the city of Acre was besieged. The officers of the teutonic order, while in its splendor, were the grand master, who resided at Marienburg; under him were the grand commander; the grand marshal, who had his residence at Konigsberg; the grand hospitaler, who resided at Elbing; the draper, who took care to furnish the habits; the treasurer, who lived at the court of the grand master, and several commanders, as those of Thorne, Culme, Brandenburg, Konigsberg, Elbing, &c. They had also their commanders of particular castles and fortresses, advocates, proveditors, intendants of mills, provisions, &c. This order is now little more than the shadow of what it formerly was, having only three or four commanderies, scarce sufficient for the ordinary subsistence of the grand master and his knights.

TEWKSBUURY, a borough-town of Gloucestershire, situated on the river Severn, ten miles north of Gloucester.

It sends two members to parliament.

TEXEL, an island of Holland, situated at the entrance of the Zuyder-sea, parted from the continent of Holland by a narrow channel, through which most ships bound to Amsterdam pass.

TEXT, a relative term, contradicting distinguished to gloss or commentary, and signifying an original discourse exclusive of any note or interpretation. This word is particularly used for a certain passage of scripture, chosen by a preacher to be the subject of his sermon.

A text-book, in several universities, is a classic author written very wide by the students, to give room for an interpretation dictated by the master or regent to be inserted in the interlines. The Spaniards give the name of text to a kind of little poem or set of verses placed at the head of a gloss, and making the subject thereof, each verse being explained one after another in the course of the gloss.

Text, in antient law-authors, is appropriated to the book of the four gospels by way of eminence.

TEXTUARIES, *textuarii*, a name given the sect of the caraites among the Jews. See the article **CARAITES**.

TEXTURE, *textura*, properly denotes the arrangement and cohesion of several slender bodies or threads interwoven or entangled among each other, as in the webs of spiders, or in cloths, stuffs, &c.

Texture is also used in speaking of any union or constituent particles of a concrete body, whether by weaving, hooking, knitting, tying, chaining, indenting, intruding, compressing, attracting, or any other way. In which sense we say a close compact texture, a lax porous texture, a regular or irregular texture, &c. A great deal depends on the texture of the component parts of a body; hence most of its particular properties, its specific gravity, colour, &c.

TEYN, a town of Bohemia, situated fifty miles south-west of Prague.

THALAMI *neruorum optidorum*, in anatomy, two oblong prominences of the lateral ventricles of the brain, medullary without, but a little cineritious within, being thus called because the optic nerves rise out of them.

THALIA, in botany, a genus of plants, the characters of which are not perfectly ascertained: the calyx is an ovato-subululated univalve spatha; the corolla consists of five ovato-oblong petals, hollowed and undulated at the edge; the two nearest the spatha are small and involute, the others are nearly equal, erect, and concave; the germen is oval: the fruit is an oval unilocular berry: the seed is single, osseous, and bilocular; the nucleus is slender.

THALICTRUM, **COMMON MEADOW RUE**, in botany, a genus of the polyandria-polygynia class of plants, the corolla whereof consists of four roundish, hollow, obtuse, deciduous petals. The fruit consists of a carinated, sulcated bark, containing only one cell: the seed is single and oblong.

This plant is an excellent aperient and strengthener of the intestines, like rhubarb; but the dose ought to be triple that of rhubarb. It is commonly said to purge bile: the flowers are effectual in spitting of blood, the fluor albus, and other female disorders; externally they are of service in the scabies, all cutaneous diseases, wounds and ulcers.

THAMES,

THAMES, a great navigable river of England, composed chiefly of the river Isis and Thame, of which the Isis is much the largest and runs the longest course, rising on the confines of Gloucestershire. At Lechlade it becomes navigable, from whence it continues its course north-east to Oxford, where it receives the Charwell: from Oxford it runs south-east to Abington, and so to Dorchester, where it receives the Thame, and continues its course south-east to Windsor, and thence runs east to London, and continues the same course to the sea, receiving the river Medway near the mouth of it. The Thame is but a small river, which rising near Tring in Hertfordshire, crosses the county of Bucks, and falls into the Isis at Dorchester.

THANE, or **THAIN**, *thanus*, a name of an antient dignity among the English and Scots, or Anglo Saxons. Skene makes thane to be a dignity equal to the son of an earl. Camden will have it, that thanes were only dignified by the offices they bore. There were two kinds or orders of thanes, the king's thanes, and the ordinary thanes: the first were those who attended the king in his courts, and who held lands immediately of the king. The ordinary thanes, or the thani minores, were the lords of the manors, who had particular jurisdiction within their limits, and over their own tenants; these changed their names for that of barons, and hence their courts are called courts-baron to this day.

THANE-LANDS, were lands granted by charters of our antient kings, to their thanes, with all immunities, except the threefold necessity of expedition, repair of castles, and mending bridges.

THANET, a little island of east Kent, formed by the branches of the Stour and the sea.

THAPSIA, **DEADLY CARROT**, in botany, a genus of the pentandria digynia class of plants, the general corolla whereof is uniform: the single flowers consist each of five crooked, lanceolated petals: the fruit is naked, oblong, surrounded longitudinally with a membrane, and separable into two parts: the seeds are two, large, oblong, and convex, pointed at each end, and having on each side a plane margin, large and undivided, which is emarginated at top and bottom.

This plant is used to provoke the menses, and other evacuations, and externally it is used in ointments for the

itch, and the like cutaneous disorders.

THAUMATURGUS, a worker of miracles, an appellation which the romanists give to several of their saints eminent for the number and greatness of their miracles.

THAWING, the resolution of ice into its former fluid state, by the warmth of the air, &c. See **FREEZING**.

Boerhaave observes, that if a sudden thaw takes place after a long sharp frost, which has bound up the rivers, and penetrated the earth's surface to a considerable depth, it is, usually, quickly succeeded by a multitude of clouds and uncommon heats, and then by thunder and lightening. The reason is, that the fat vapours and exhalations raised by the subterraneous heat, have long remained imprisoned under that covering of the earth, as appears hence, that if the ice of a ditch be broke in the middle of a severe frost, it presently emits warm vapours, and this the more plentifully, as well as the hotter, by how much the frost is harder and the ice thicker. As soon, therefore, as the exterior frozen turf of earth is softened by warmth, the pent-up vapours immediately escape through all the passages they can find, and mounting on high, form clouds, which being driven about, and sometimes illumined by the sun, produce such effects. Hence these violent thunders in Muscovy, Sweden, and Denmark, after a thaw.

THAXTED, a market-town of Essex, situated 18 miles north of Chelmsford.

THEA, **TEA**, in botany. See **TEA**.

THEATINES, a religious order in the romish church, so called from their principal founder John Peter Caraffa, then bishop of Theate, or Chiete, in the kingdom of Naples, and afterwards pope, under the name of Paul IV. The names of the other founders were Gaetan, Boniface, and Configlieri. These four pious men desiring to reform the ecclesiastical state, laid the foundation of an order of regular clerks at Rome, in the year 1524. Pope Clement VII. approved the institute, and permitted the brethren to make the three religious vows, to elect a superior every three years, and to draw up statutes for the regulation of the order. They first endeavoured, by their example, to revive among the clergy the poverty of the apostles and first disciples of our Saviour, and were the first who assumed the title of regular clerks.

THEATRE, *θεατρον*, in antiquity, a public

lie edifice for the exhibiting of scenic spectacles, or shews, to the people; comprehending not only the eminence on which the actors appeared, and the action passed, but also the whole area of the place, common to the actors and spectators.

The Romans borrowed the form of their theatres from those of the Greeks, which were generally built in the shape of a semi-circle, encompassed with porticos, and furnished with seats of stone, disposed in semi-circles, rising gradually one above another.

The principal parts of the antient theatres were the *scena*, *proscenium*, *orchestra*, and *area*. See the articles *SCENA*, *PROSCENIUM*, &c.

Among the moderns, theatre more peculiarly denotes the stage, or place whereon the drama or play is exhibited; answering to the *proscenium* of the antients. It is also used, in a more comprehensive sense, for the whole play-house. See the articles *DRAMA*, *PLAY*, &c.

THEATRE is also used in architecture, chiefly among the Italians, for an assemblage of several buildings, which, by a happy disposition and elevation, represents an agreeable scene to the eye.

Anatomical **THEATRE**, in a school of medicine and chirurgery, is a hall, with several rows of seats, disposed in the circumference of an amphitheatre; having a table bearing on a pivot, in the middle, for the dissection of bodies.

THEBAID, *thebais*, a celebrated heroic poem of Statius, the subject whereof is the civil war of Thebes, between the two brothers Eteocles and Polynices; or, Thebes taken by Theseus.

The thebaid is censured by the best of critics, for a multiplicity of fables and actions; for too much heat and extravagance, and for going beyond the bounds of probability.

THEBES, the name of an ancient city in upper Egypt, now in ruins; as also an antient city of Achaia, now a province of european Turkey.

THEFT, *furtum*, in law, an unlawful felonious taking away another man's moveable and personal goods, against the owner's will, with intent to steal them.

It is divided into theft or larceny, properly so called, and petit theft; or petit larceny; the former whereof is of goods above the value of 12 d. and is deemed felony; the other, which is of goods under that value, is not felony. See the articles *FELONY* and *LARCENY*.

THEFTBOTE, the receiving a man's goods again from a thief, or other amends, by way of composition, and to prevent prosecution, that the felon may escape unpunished; the punishment whereof is imprisonment, but not the loss of life or member.

THEISM, or **DEISM**. See *DEISM*.

THELIGONUM, in botany, a genus of the monoecia-polyandria class of plants, having no corolla: the calyx is bifid, and the pistil single: the fruit is a coriaceous capsule, containing only a single cell, and in it one globose seed.

THELONIUM, in law-books, is used to denote any kind of toll: hence, citizen and other persons who have a right to be free from toll, may have a writ called *breve essendi quieti de thelonio*.

THEME, in matters of education, denotes the subject of an exercise, for young students to write or compose on.

THEME, among astrologers, denotes the figure representing the state of the heaven for any time required; that is, the place of the stars and planets for that time. See the article *HOROSCOPE*.

THENAR, in anatomy, the abductor muscle of the thumb: it has its origin in the transverse ligament that joins the bones of the carpus, and its termination in the first and second phalanx: the two sesamoid bones of the thumb are usually found lodged in the tendon of this muscle. The abductor-muscle of the great toe likewise called thenar, has its origin from the internal side of the calcaneum, and the os naviculare; and its termination at the internal side of the great toe, beside the internal sesamoid bone.

THEOBROMA, the **CHOCOLATE-NUT TREE**, in botany, a genus of the polyadelphia-pentandria class of plants, the corolla of which consists of five erect patent petals, each of them armed with bifid seta: the nectarium is of a campanulate figure, and erecto-patent: the fruit is a woody cortex, of an unequal surface, with five ridges, and has seeds lodged in five serieses within it: these are numerous, fleshy, nearly of an oval figure, and serve to make chocolate. See the article *CHOCOLATE*.

This genus comprehends the cacao of Tournefort, and the guazuma of Plumier the former of which has a quadrangular pod, lengthened at each extremity; and the latter, a globose fruit, covered with tubercles, and its rind perforated in the manner of a sieve. See *CACAO*.

THEO



THEOCRACY, *Θεοκρατία*, in matters of government, a state governed by the immediate direction of God alone: such was the antient government of the Jews, before the time of Saul.

THEODOLITE, a mathematical instrument much used in surveying, for the taking of angles, distances, &c.

It is made variously, several persons having their several ways of contriving it, each more simple and portable, more accurate and expeditious than others. The common one consists of a brass-circle about a foot diameter, cut in the form represented in plate CCLXXV. fig. 1. n° 1. having its limb divided into 360 degrees, and each degree subdivided, either diagonally, or otherwise, into minutes.

Underneath, at *cc*, are fixed two little pillars *bb* (*ibid.* n° 2.) which support an axis, whereupon is fixed a telescope consisting of two glasses, in a square brass-tube, for the viewing of remote objects.

On the center of the circle moves the index *C*, which is a circular plate, having a compass in the middle whose meridian line answers to the fiducial line *aa*: at *bb*, are fixed two pillars to support an axis which bears a telescope like the former, whose line of collimation answers to the fiducial line *aa*. At each end of either telescope, is fixed a plain sight for the viewing nearer objects.

The ends of the index *aa* are cut circularly, to fit the divisions of the limb *B*; and when that limb is diagonally divided, the fiducial line, at one end of the index, shews the degrees and minutes upon the limb. The whole instrument is mounted with a ball and socket, upon a three-legged staff.

Most theodolites have no telescopes, but only four plain sights, two of them fastened on the limb, and two on the ends of the index.

Mr. Sisson's improved theodolite being one of the best of these instruments, we shall here give its description, *ibid.* n° 3. The three staves, whereby it is supported, screw into bell-metal joints by brass-ferrils at top, which are moveable between brass-pillars fixed in a strong brass-plate; in which, round the center, is fixed a socket with a ball moveable in it, and upon which the four screws press that set the limb horizontal. Next above is such another plate, through which the said screws pass, and on which round the cen-

ter is fixed a frustum of a cone of bell-metal, whose axis, being connected with the center of the ball, is always perpendicular to the limb, by means of a conical brass ferril fitted to it, whereon is fixed the compass-box, and on it the limb, which is a strong bell-metal ring, whereon are moveable three brass indexes, in whose plate are fixed four brass-pillars, that joining at top, hold the center-pin of the bell-metal double sextant, whose double index is fixed in the center of the same plate. Within the double sextant is fixed the spirit-level, and over it the telescope. See the article **LEVEL**.

The compass-box is graved with two diamonds for north and south, and with 20 degrees on both sides of each, that the needle may be set to the variation, and its error also known.

The limb has two fleur-de-luces against the diamonds in the box, and is curiously divided into whole degrees, and numbered to the left hand at every 10° to twice 180°, having three indexes (with Nonius's divisions on each for the decimals of a degree) that are moved by a pinion fixed below one of them without moving the limb, and in another is a screw and spring under, to fix it to any part of the limb: it has also divisions numbered for taking the quarter girt in round timber; to which a shorter index is used, having Nonius's divisions for the decimals of an inch; but an abatement must be made for the bark, if not taken off. See **RULE**. The double sextant is divided on one side from under its center (when the spirit-tube and telescope are level) to above 60 degrees each way, and numbered at 10, 20, &c. And the double index (through which it is moveable) shews on the same side the degree and decimal of any altitude, or depression to that extent, by Nonius's divisions; on the other side are divisions numbered for taking the upright height of timber, &c. in feet, when distant ten feet, which at 20 must be doubled, and at 30 trebled; and also the quantities for reducing hypotenusal lines to horizontal: it is moveable by a pinion fixed in the double index. See the article **SURVEYING**.

The telescope is a little shorter than the diameter of the limb, that a fall may not hurt it; yet it will magnify as much, and shew a distinct object as perfect, as most of treble its length: in its focus are very fine cross wires, whose intersection

is in the plane of the double sextant, and this was a whole circle, and turned in a lathe to a true plane, and is fixed at right-angles to the limb; so that whenever the limb is set horizontal (which is readily done by making the spirit-tube level over two screws, and the like over the other two) the double sextant and telescope are moveable in a vertical plane, and then every angle taken on the limb (though the telescope be never so much elevated or depressed) will be an angle in the plane of the horizon, and this is absolutely necessary in the plotting an horizontal plane. See PLOTTING and TELESCOPE.

The use of the theodolite is abundantly shewn in that of the graphometer, or semi-circle, which is only half a theodolite; and in that of the plain table, which is occasionally made to be used as a theodolite. Note, the index and compass of a theodolite, likewise serve for a circumferentor, and are used as such. See the articles GRAPHOMETER, PLAIN-TABLE, and CIRCUMFERENTOR.

THEOGONY, that branch of the heathen theology, which taught the genealogy of their gods. See the article GOD.

THEOLOGIUM, in the antient theatre, a kind of little stage, above that whereon the ordinary actors appeared; being the place where the machinery of the gods were disposed; whence the name.

THEOLOGY, or DIVINITY, a science which instructs us in the knowledge of God, or divine things; or which has God, and the things he has revealed, for its object. See the article GOD.

Hence theology may be distinguished into natural, which comprehends the knowledge we have of God from his works, by the light of reason alone; and supernatural, which contains what we are taught concerning God in revelation.

Theology is again distinguished into positive, moral, and scholastic. Positive theology is the knowledge of the holy scriptures, and of the signification thereof, conformably to the opinions of the fathers and councils, without the assistance of any argumentation. Some will have it, that this ought to be called expostive, rather than positive. Moral theology, is that which teaches us the divine laws relating to our manners and actions. Scholastic, or school theology, is that which proceeds by reasoning; or that derives the knowledge of several divine things from certain established principles of faith.

THEONVILLE, a city of Luxemburg situated on the river Moselle: east long 6°, north lat. 49° 32'.

THEOPHRASTA, in botany, a genus of the pentandria-monogynia class of plants, with a monopetalous campanulate petal, semi-quinquifid at the limb the fruit is a large, globose, unilocular capsule, containing a great many roundish seeds.

THEORBA, THIORBA, or TIORBA, a musical instrument made in form of a large lute, except that it has two neck or juga, the second and longer whereon sustains the four last rows of chords which are to give the deepest sounds.

THEOREM, a speculative proposition, demonstrating the properties of any subject. Theorems are either universal, which extend to any quantity, without restriction universally; as this, that the rectangle of the sum, and difference of any two quantities, is equal to the difference of their squares: or particular, which extend only to a particular quantity; as this, in an equilateral right-lined triangle, each of the angles is 60 degrees.

Theorems are again distinguished into negative, local, plane, and solid.

A negative theorem is that which expresses the impossibility of any assertion; as that the sum of two biquadrate numbers cannot make a square number. A local theorem is that which relates to a surface; as, that the triangles of the same base and altitude are equal. A plane theorem is that which either relates to a rectilinear surface, or to one terminated by the circumference of a circle; as that all angles in the same segment of a circle are equal. And a solid theorem is that which considers a space terminated by a solid line; that is by any of the three conic sections. *e. gr.* this: that if a right lines cut two asymptotic parabolas, its two parts terminated by them shall be equal.

Reciprocal THEOREM, is one whose converse is true; as that, if a triangle have two equal sides, it must have two equal angles; the converse of which is likewise true, that, if it have two equal angles, it must have two equal sides.

THEORETIC, or THEORETICAL, something relating to theory, or that terminates in speculation. See THEORY. Hence theoretical astronomy is that part of astronomy, which accounts for the various phenomena of the stars and planets. See STAR and PLANET.

THEORY,

THEORY, in general, dem'tes any doctrine which terminates in speculation alone, without considering the practical uses and application thereof. Thus the theory of chemistry, for instance, contains all the general truths which the particular experiments of chemists have hitherto demonstrated. These are, on this occasion, to be taken for granted, and the whole body of such truths makes the universal theory of chymistry, for chymistry is no science *formel a priori*; it is no production of the human mind, or raised by reasoning, but collected *a posteriori* from experiments: it took its rise from various operations casually made, and observing those that had one and the same uniform tendency, without any expectation of what followed; and was only reduced into an art, by collecting and comparing the effects of such uncertain experiments, and noting the tendency thereof: so far then as a number of experiments agree to establish any unquestionable truth; so far they may be considering as constituting the theory of chemistry. See **CHEMISTRY**.

Such a theory is necessary to be premised to every art; and something equivalent to this is practised by every artisan, in teaching his disciple how to proceed orderly in the exercise of his art; and accordingly it would be impossible to teach the practice of chymistry to advantage, without having first given some such theory. Thus it would be to little purpose, to give a novice a parcel of rose-mary, for instance, and bid him, without any addition, distil a water from it, which should contain the natural taste and odour of the plant; unless he knew before-hand this general truth, that plants, exposed to a gentle heat, like that of the summer's sun, do exhale their most subtle and volatile parts, which, being collected and condensed by means of proper vessels, appear in form of waer, and are the thing required.

THIRAPEUTÆ, a term applied to those who are wholly employed in the service of religion. This general term has been applied to particular sects of men, concerning whom there have been great disputes among the learned.

It is generally supposed that St. Mark established a particular society of christians about Alexandria, of whom Philo gives an account, and calls them Therapeutæ. He speaks of them as a particular sect, retired from the world, who

spent their time in reading the writings of antient authors, in singing hymns and songs composed by some of their own sect, and in dancing together the whole night. Scaliger maintains, they were Essene Jews; but Valefius rejects this opinion of Scaliger, 1. Because Philo never calls them Essenes. 2. Because there were no Essenes but in the holy land; whereas the Therapeutæ were spread through Greece, and all the barbarous nations. 3. Because Josephus, who gives a very ample account of the Essenes, does not say one word of the Therapeutæ.

THERAPEUTICE, **THERAPEUTICS**, that part of medicine which acquaints us with the rules that are to be observed, and the medicines to be employed in the cure of diseases. See the article **DISEASE**.

THERAPHIM, or **TERAPHIM**, certain images, or superstitious figures mentioned in scripture. Some jewish writers tell us, the theraphim were effigies of human heads, placed in niches, and consulted as oracles. Others say, they were talismans, or figures of metal, cast and engraved under certain aspects of the planets; to which they ascribed extraordinary effects. All the eastern people are much addicted to this superstition; and the Persians still call them *telefin*, a name nearly approaching to theraphim.

The learned Spencer makes the word theraphim to be the same as seraphim, by change of the S into T: whence it follows, that these images were representations of these angels called seraphim. M. Jurien supposes them to have been a sort of dii penates, or household gods.

THERIACA, **ANDROMACHI**, a compound medicine, made in the form of an electuary, the ingredients of which, according to the college of London physicians, are as follows: Take of the troches of squills, half a pound; long pepper, opium strained, dried vipers, of each three ounces; cinnamon, balsam of Gilead, or in its stead expressed oil of nutmeg, of each two ounces; agaric, the root of florentine orrice, water germander, red roses, seeds of nawey, extract of liquorice, of each an ounce and a half; spikenard, saffron, amomum, myrrh, costus, or in its stead zedoary, camel's hay, of each an ounce; the root of cinquefoil, rhubarb, ginger, indian leaf, or in its stead mace, leaves of dittany of Crete, of hore-hound, and of calamint, french lavender, black pepper, seeds of macedonian parsley, oilbanum, chio

chio turpentine, root of wild valerian, of each six drams; gentian root, celtic-nard, spiguel, leaves of poley-mountain, of St. John's wort, of ground pine, tops of creeping germander, with the seed, the fruit of the balsam-tree, or in its stead cubebs, aniseed, the lesser cardamom seeds husked, seeds of bishop's weed, of hartwort, of treacle mustard, or mithridate mustard, juice of the rape of cistus, acacia, or in its stead japan earth, gum arabic, storax strained, saggapenum strained, lemnian earth, or in its stead bole armenic or french bole, green vitriol calcined, of each half an ounce; root of creeping birthwort, or in its stead of the long birthwort, tops of the lesser centaury, seeds of the carrot of Crete, opopanax, galbanum strained, russia castor, jew's pitch, or in its stead, white amber prepared, root of the sweet flag, of each two drams; of clarified honey, thrice the weight of all the rest. The ingredients are to be mixed in the same manner as in the mithridate.

The college of Edinburgh have given the following reformation of this composition, under the title of Theriaca Edinensis.

Take of Virginian snake root, six ounces; wild valerian root, contrayerva root, each four ounces; aromatic powder, three ounces; resin of guaiacum, russia castor, myrrh, each two ounces; english saffron, opium, each one ounce; clarified honey, thrice the weight of the powders; canary wine, as much as is sufficient to dissolve the opium. This composition consists of very powerful ingredients, and is doubtless capable of answering every thing that can be reasonably expected from the more voluminous theriaca of Andromachus.

The theriaca andromachi is a reform of mithridate, made by Andromachus, physician to Nero; for the virtues whereof, see the article MITHRIDATE.

THERMÆ, artificial hot baths, much used by the Romans. See BATH.

THERMOMETER, an instrument for measuring the increase and decrease of the heat and cold of the air, by means of the elastic and expansive power of bodies of the fluid sort. See the articles AIR, HEAT, COLD, &c.

Many different ways, methods, and forms of constructing such an useful instrument have been thought of, and invented at several times for this purpose;

at first air, then oil, then spirits of wine; and lastly, quicksilver, have been every way attempted and tortured in this experiment.

The spring of air, being sooner affected by heat and cold than that of any other fluid, was first thought upon as the best expedient to answer this end; and so it really would be, were it not that the weight or pressure of the atmosphere affects it also at the same time; and by acting sometimes with, sometimes against it, renders the effect by heat or cold very uncertain, and, therefore, the instrument useless. For example: the air in the bottle A F (plate CCLXXV. fig. 2. n^o 1.) will, by its expansion, when the air grows warmer, raise the water higher in the tube than the point H; and if the air be lighter at this time, it will press less on the surface of the water at H, and so will suffer it to rise still higher. But if the air be heavier, it will act against the spring, and not permit it to raise the water so high. The same may be observed with respect to its contraction by cold; wherefore such an instrument, for common or constant use, will not do at all, though, perhaps, none is better calculated for some extemporaneous uses, as measuring the degree of coldness in different cellars, or of warmth in divers rooms upon the same floor.

It was upon this account found necessary to have recourse to some other fluid, which, secured from the pressure of the air in a tube, hermetically sealed, might expand and contract solely by the heat and coldness of the air about it. And, because most fluids are subject to freeze or thicken in great degrees of cold, it was soon considered that spirits of wine, a little tinged with cochineal, would best answer the purpose, and accordingly thermometers were generally made therewith, and became of common use.

Though the spirit of wine thermometers would do very well to shew the comparative heat of the air, yet this was far short of the virtuoso's views, who wanted to explore the various and vastly different degrees of heat in other bodies, as boiling water, boiling oils, melted metals, and even fire itself, and degrees of cold too, beyond what the spirit thermometer can shew. For spirit in a moderate degree of heat will burst the tube; and in an intense degree of cold will freeze, as the french philosophers found, who went to measure a degree upon the surface of the

the earth under the north polar circle. It having been found by experiment, that linseed oil required four times the degree of heat to make it boil as water did, it was quickly substituted instead of spirits for philosophic uses. This Sir Isaac Newton always used, and by it discovered the comparative degree of heat which makes water boil, which melts wax, which makes spirit of wine boil, and melts tin and lead; beyond which we do not find the oil thermometer has been applied: for which reason (as also for its sullying the tube) it has been less used of late.

The mercurial thermometer, which will sustain any degree of heat or cold, as far as any instrument of this kind can be expected to do, as invented by Mr. Farenheit, of Amsterdam; and though several artificers made them as well as he, yet they still go by his name. Dr. Boerhave used only this thermometer. As the mercury very freely and uniformly expands itself from hard frost to the heat of summer, so one sort of those thermometers are contrived with a scale, to include those extremes only, and the beginning of the divisions, or 0, is fixed to that altitude of the quicksilver, as is observed when water just begins to freeze, or snow to thaw; for which reason that is called the freezing point in the scale. This thermometer is small, short, put in a net frame, and carried in the pocket any where.

But the grand thermometer of Farenheit is graduated after a different manner, as destined to a more critical and extensive use. In this the bulb, or large part at the bottom, is not spherical, as in common ones; but cylindrical; to the end, that the heat may penetrate and reach the inmost parts as soon as possible, so that the whole may expand uniformly together. Hence it is, that in the cylindrical bulb the fluid will expand and rise immediately, whereas in the spherical bulb it is seen first to fall (by the sudden expansion of the ball, before the fluid is heated) and then to rise, by the expansion of the fluid when heated. We have given a figure, both of Farenheit's mercurial thermometer, and also of Sir Isaac Newton's made with linseed oil. See plate CCLXXV. fig. 2. n^o 2.

Sir Isaac's seems to be the best fitted of any for a standard weather thermometer; and even for any degree of heat which the various states of the human body

exhibit; and also for those different degrees which vegetation requires in the green-house, hot-bed, &c. In all which cases it is necessary there should be one common, unerring, and universal measure, or standard, which at all times, and at every place, will shew the same degree of heat, by the same expansion of the fluid, according to which the scale should be made in every standard thermometer. In order to this, the tube proposed should be very nicely weighed, when empty, and then the bulb, and about a tenth part of the length of the tube above it, is to be filled with quicksilver; then it is to be weighed again, and the excess of this, above the former weight, will give the weight of the quicksilver poured in; this will give the weight of the 100th part. Let a mark be made with a file upon the tube at the surface of the inclosed quicksilver.

Then weigh out nine or ten parcels of quicksilver, each equal to a hundredth part of that first put in the tube, and having poured the several parcels in one after another upon the inclosed quicksilver, and marked the tube successively at the surface of each parcel, you will have the tube divided into proper intervals, which, if the bore of the tube be everywhere the same, will be equal to each other; if not, they will be unequal; and each of these intervals is to be divided into ten others, increasing or decreasing as the intervals do.

When this is done, the capacity of the tube is divided into thousandth parts of that of the ball, and the contiguous part of the tube reaching up to the first mark. The tube is now to be put into a frame, and by the side of it is to be placed a scale, divided into thousandth parts, exactly corresponding to those on the tube; and writing 1000 over against the first mark, you write 1010 over against the second, 1020 against the third, and so on, as you see in the figure.

The standard thermometer-tube, and its scale, being thus constructed, is then to be filled with some proper fluid, as linseed-oil, where great degrees of heat are not proposed; and mercury is to be used, when they are. When the fluid is poured in, it is to be adjusted in such a quantity, that it may stand just at the principal point, marked 1000, in water just freezing. And here great precaution is to be used; for many trials must de-

termine this point to which the fluid must always rise by slow degrees, and with an uniform motion.

When this point is well secured, all the trouble is over, the ball, being then immersed in boiling water, spirits, oils, melted metals, &c. in snow, freezing mixtures, &c. the expansions, by all the various degrees of heat and cold, will be shewn by the number against the heights to which the fluid rises in the tube, in each case, these are to be wrote on the side of the scale; and, since the same degree of heat will cause the same expansion of the same fluid at all times, it is evident, if thermometers were everywhere constructed in this manner, the observations made by them in any part of the world, may be compared together, which cannot otherwise be done; whence this part of philosophy would receive its final perfection.

By one of those standard thermometers well made, many more might soon be constructed with any expanding fluid, without the trouble of graduating their tubes by equal quantities of quicksilver. For having filled the balls, and a convenient part of the tube, with the proposed fluid, place them all together in a vessel of cold water; and while it is warming as gently as possible, when the oil in the standard thermometer shall arrive successively at the several divisions of its scale, at the same instant of time mark the new tubes at the several heights of their fluids, and form a scale for every tube, that shall correspond to those marks. Then, while the liquors subside by cooling gently, examine whether they nicely agree at the several marks. To determine the freezing point in all, they are to stand together in the water till it just begins to freeze: or, having all the other points duly, that may be deduced very exactly by the rule of proportion.

A thermometer that shall vary very sensibly by every small variation of heat and cold, as those of the atmosphere, must have a large ball in proportion to the bore of the tube; and, that the heat or cold may sooner penetrate the innermost parts of the liquor, the ball should not be spherical, but oblong and flatted like a french flask; and the lengths of the tubes should be proportioned to the degrees of heat they are intended to discover.

Sir Isaac Newton graduated his standard

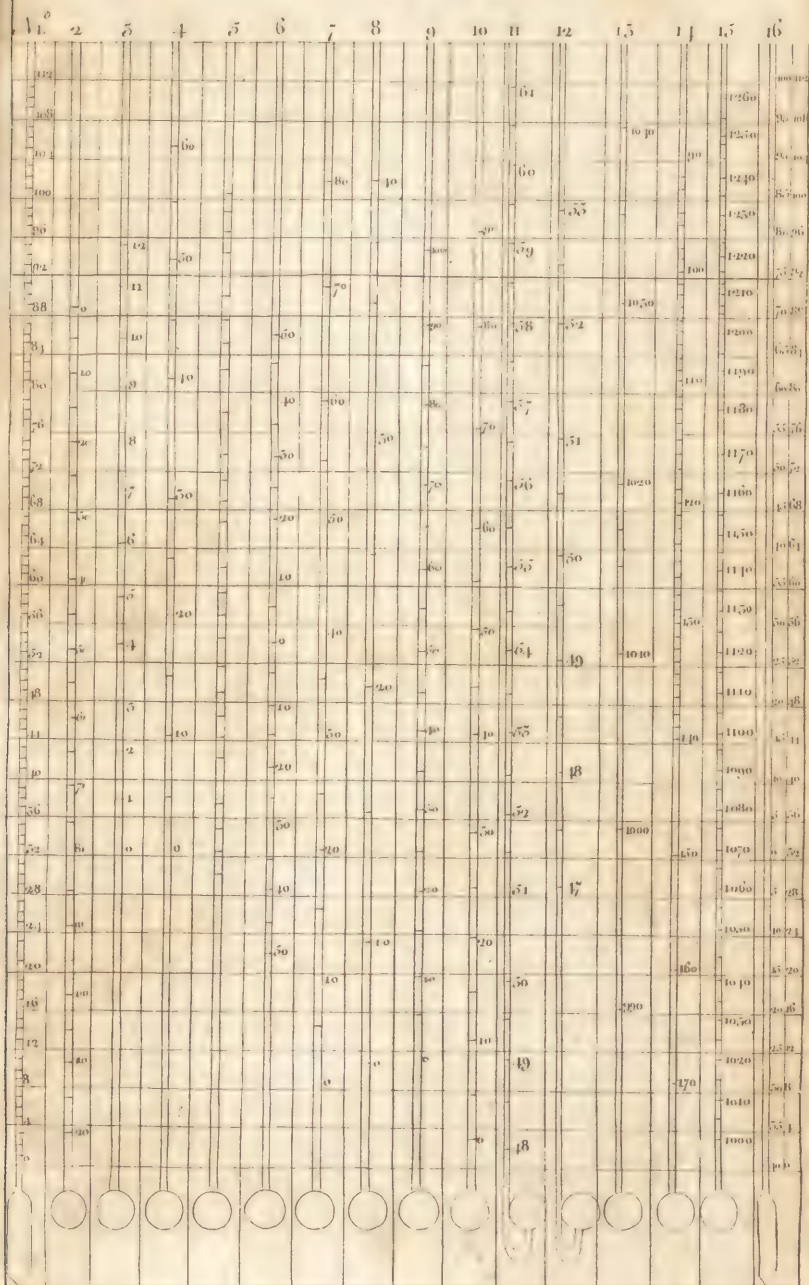
thermometer on both sides, as shewn in the figure. Those on the right hand measured the heat of the oil; as those on the left measured the bulk thereof: but since the latter, as well as the former, begins from a cypher at the freezing point, and is regularly continued upwards by the common divisions 10, 20, 30, 40, &c. it will equally serve both purposes; since the degree of heat will always be proportioned to the expansion of the bulk of the fluid above or below the freezing point.

By this division therefore on the left hand, we shall express some of the principal articles of Sir Isaac Newton's scale of the various degrees of heat, as in the table below.

D. of heat.

0	Water just freezing, and snow just thawing.
1	} The heats of the air in winter.
to 4	
4	} The heats of the air in spring and autumn.
to 8	
8	} The heats of the air in summer.
to 12	
13	The greatest summer-heat.
26	The greatest heat of the external parts of the human body.
31	Water just tolerable to the hand at rest.
36½	Water hardly tolerable to the hand in motion.
43	Melted wax just growing stiff and opaque.
51½	Melted wax just before it bubbles or boils.
54	Spirit of wine just begins to boil.
72	Water begins to boil.
75	Water boils vehemently.
86	A mixture of $\frac{1}{6}$ of lead, $\frac{2}{3}$ of tin, and $\frac{1}{2}$ bismuth, melts.
103	A mixture of equal parts of tin and bismuth melts.
122	A mixture of $\frac{3}{4}$ of tin and $\frac{1}{4}$ of lead melts.
154	The heat which melts tin.
174	The heat which melts bismuth.
206	The least heat which melts lead.
290	The heat with which burning bodies shine in a dark place.
470	The heat of a small coal-fire.
450	The heat of a small wood-fire.
Dr. Hales considers the freezing point as	

A Comparative View of the most remarkable THERMOMETERS



J. Jefferys sculp



one boundary to vegetation, *viz.* on the side of cold; and the other boundary he fixes to that degree of heat with which wax will begin to melt, because a greater degree of heat will, instead of collecting and assimilating the nutritive particles, dissipate them, even those which are most viscid and glutinous; and therefore the plant will rather fade than vegetate in such degrees of heat.

This space the doctor divided into one hundred equal parts in his thermometers: but his numbers, expressed in those of the standard-thermometer, are for several particulars mentioned by the doctor as follows. For myrtle, $4\frac{1}{2}$; oranges, $6\frac{1}{2}$; ficoides, $7\frac{1}{2}$; indian fig, $8\frac{1}{4}$; aloe, 10; cereus, 11; euphorbium, 12; piamento, 13; ananas, $14\frac{1}{2}$; melon-thistle, $15\frac{1}{4}$; air under the glass of a hot-bed, 17; the hot-bed itself, 28. If the hot-bed exceed the heat of 40, or thereabouts, it will scorch the plants and kill them. The heat of milk from the cow is 28, that of urine 29, and of blood in a fever nearly 40.

As Farenheit's thermometer is come into such general use, we have here placed it by the standard thermometer, that the divisions on each may be reduced to the other's respectively by bare inspection, and the use of both be still preserved.

But that the reader may be enabled to form some idea of the several sorts of thermometers, and the different methods of graduating them; we have given a comparative view of the most remarkable ones in plate CCLXXVI. where n^o 1. represents Farenheit's thermometer; n^o 2. that of the Royal society; n^o 3. Sir Isaac Newton's; n^o 4. Dr. Hales's; n^o 5. that of Edinburgh; n^o 6. Fowler's; n^o 7. and 8. those of Florence; n^o 9. that of Paris; n^o 10. Dela Hire's; n^o 11. Amonton's; n^o 12. Poleni's; n^o 13. Reaumur's; n^o 14. De l' Isle's; n^o 15. Crucquis's, and n^o 16. Th. de Lyon's. The reader may also consult Dr. George Martin's treatise on this subject, where he will find it explained to his satisfaction.

THERMOSCOPE, an instrument shewing the changes happening in the air with respect to heat and cold.

The word thermoscope is generally used indifferently with that of thermometer, tho' there is some difference in the literal import of the two; the first signifying an instrument that shews, or exhibits, the changes of heat, &c. to the eye; and

the latter an instrument that measures those changes; on which foundation the thermometer should be a more accurate thermoscope, &c. This difference the excellent Wolfius taking hold of, describes all the thermometers in use as thermoscopes; shewing that none of them properly measures the heat, &c. none of them do more than indicate the same. Though their different heights, yesterday and to-day, shew a difference of heat, yet, since they do not discover the ratio of yesterday's heat to to-day's, they are not strictly thermometers.

THESEA, in antiquity, feasts celebrated, by the Athenians, in honour of Theseus, consisting of sports and games, with mirth and banquets: such as were poor and unable to contribute to them were entertained at the public expence.

THESIS, a general position which a person advances, and offers to maintain. In colleges it is frequent to have placards, containing a number of them, in theology, in medicine, in philosophy, in law, &c.

THESIUM, in botany, a genus of the pentandria-monogynia class of plants, having no corolla but the calyx, which being coloured on the inside has past for a corolla with some: there is no pericarpium: the calyx holds in its bottom a single roundish seed.

THESSALY, now called Janna, a province of european Turkey, bounded by Macedonia, on the north; by the Archipelago, on the east; by Achaia, or Livadia, on the south; and by Epirus, on the west.

THETFORD, the county-town of Norfolk, situated twenty-five miles south-west of Norwich.

It sends two members to parliament.

THEVETIA, in botany, a genus of the pentandria-monogynia class of plants, the corolla whereof consists of an infundibuliform petal: the tube is oblong: the limb large, and divided into five segments: the fruit is an orbiculated, unilocular, depressed drupe, acuminate on the central part: the seed is an ovato-trigonal nut.

THEURGY, a name given to that part of magic called white magic, or the white art. Those who have written of magic have divided it into three kinds; the first is theurgy, as operating by divine means: the second, natural magic; performed by the powers of nature: and the third, necromancy; which they imagined proceeded from

from invoking dæmons. See **MAGIC**.

THIBET, or **TIBET**, one of the most powerful of the Tartar kingdoms, having China on the east, and India on the west.

THIGH, *femur*, in anatomy, that part of the body of men, quadrupeds, and birds, between the leg and the trunk. See the article **FEMUR**.

Fractures and Luxations of the THIGH.

The thigh-bone, though the largest and stoutest in the whole body, is yet frequently broken, both near its middle and towards its ends or articulation, but more particularly near that part called its neck, near its articulation with the hip-bone; and when this is the case it is very difficult to set it, and retain it in its place. When the bone is broken in two places at once, which sometimes happens, the danger is much greater. Sometimes this bone is broken transversely, sometimes obliquely, and at other times the ends slip in a great way over one another, notwithstanding the utmost caution in setting it. It is therefore necessary in these cases, according to Heister, besides the means that are common to all the fractures, to use a more strict and tight bandage in this than in the transverse fracture, to prevent the bones from being easily removed. When a fracture of the thigh-bone happens near the middle, or towards its lower head, it is to be extended and replaced with the hands like other fractures, except that the extending force required is very great: and where the hands of a strong assistant are not enough, slings, napkins, or linen-bandages are to be bound round each head of the thigh, whereby the fractured bone may be extended both ways by the strength of three or four persons at once, while the surgeon cautiously reduces the fracture with his hands, and secures it with a proper bandage and dressing: and there are sometimes cases where the joint strength of three or four men applied in this manner, is not sufficient to make the necessary extension; in which case the surgeon is obliged to have recourse to ropes and pullies, by means of which one man will pull more forcibly and equally than several can without them: but cases that require this treatment are not common. See the articles **FRACURE** and **EXTENSION of fractured limbs**.

When the neck of the thigh-bone is frac-

tured, to which, from its oblique or transverse direction, and spongy or brittle substance, it is very subject, it makes a fracture not only difficult to reduce, but such a one as can seldom be cured without leaving the limb shorter than it was before. The reasons of which are, that the fragments cannot, but with great difficulty, be pressed into their right places, by reason of the great thickness and strength of the muscles which cover them; and, that it seldom happens that the bones can be retained in their natural position, after they have been ever so well reduced; because the muscles which pass over, and are inserted below, the neck of this bone, draw its lower part upwards: to which it may be added, that it is very difficult to discover when the neck of the thigh-bone is fractured; this case being usually taken for the head of the bone being slipped out of its socket. If the fracture of the bone be accompanied with a wound, it makes the case very difficult and dangerous; and if these accidents happen to be inflicted on the neighbouring joint, death is generally the consequence, more especially when any of the large vessels are wounded. See **WOUND** and **HÆMORRHAGE**.

The thigh-bone, Heister observes, is found to be capable of luxation four ways, upwards and downwards, and backwards and forwards; but it is most frequently dislocated downward and inward, towards the large foramen in the os pubis. For besides that the cartilaginous defence on the lower part of the acetabulum is not so high as on the rest, the ligamentum rotundum is ever found to give way more readily in that part than in any other; and, lastly, the adjacent muscles are found to be weakest on this part. And there is besides, a certain eminence in this edge of the acetabulum which prevents the head of the bone from falling back again easily into its right place when once it is got this way out of it. But if the head of this bone be displaced outwards, it generally slips upwards at the same time, it being scarce possible but that the very strong muscles of the thigh must then draw the bone upwards; and there is no eminence in this edge of the acetabulum to resist the head of the bone in that passage. See **LUXATION**.

When the thigh is dislocated forwards and downwards, which is what most usually is the case, the leg hangs straddling

ling outward, and is longer than the other; the knee and foot also both turn outwards, and the head of the bone itself will be felt near the lower part of the inguen and os pubis. Sometimes there is a suppression of urine in this case, which is occasioned by some nerve which communicates with the bladder being violently compressed; in the buttock there also may be perceived a cavity from the trochanter major, and the rest of the bones being displaced; and if the thigh-bone be not timely reduced into its acetabulum, the whole limb withers soon afterwards. The patient, for this reason, can bear little or no stress upon that limb, but must always incline and throw the weight of his body upon the other; when he moves forward, he must move that limb in form of a semicircle, and support his body by crutches under the arms: though there are not wanting particular cases where the head of the luxated thigh-bone has grown so firmly to the adjacent part, without the acetabulum, as to become, in process of time, so strong as to support the body without sticks, though the person could not, in any of the cases that have been known of this kind, walk without halting.

If the thigh-bone be displaced backward, it is usually drawn upward also, as before observed, at the same time; hence there will be perceived, in this case, a cavity behind the inguen, and a tumour upon the buttock, because the head, and trochanter of this bone, will be placed there. The tumour on the buttock being thrust upward, the limb will become shorter than before, and the foot will be inclined to turn inwards. The heel will not touch the ground, but the person seem to stand upon his toes; and lastly, the luxated limb will be much more easily bent than extended.

It is extremely rare that the thigh is luxated forward or backward, without being also drawn upward or downward; but if it should so happen, it will yet evidently be discovered by the rules before given, and by considering the nature of the articulation of the bone: as it is, however, at best very difficult to discover when the thigh-bone is dislocated, and when it is fractured, either by feeling or inspecting, because of the great thickness of the muscles and integuments: it is therefore a matter of some consequence to propose the signs by which one of these cases may be known from the

other. There is reason to judge the thigh-bone to be luxated when we find the ligaments of the bone have been relaxed by some preceding congestion of humours, when no external violence has been exerted upon it, when neither violent pain, tumours, nor inflammation follow; and lastly, when the whole limb may be bent, and turned about at the acetabulum, without the surgeon's discovering any grating or crushing of the bones; and the contrary of these signs, which are what usually take place, in what have been used to be called luxations of this bone, are very strong indications of a fracture.

When the bone is found to be really dislocated, it is to be reduced in a method agreeable to the nature and direction of the dislocation. When it is displaced forward and downward, the patient is to be laid flat upon his back on a table; then a linen napkin, or strong sling, is to be made fast about the groin, over the part affected, so that one end of the sling may come over the belly, and the other over the nates and back, to be both tied together in a knot upon the spine of the os ileum, and afterwards either fastened to a hook fixed in some post, or held firm by some assistance: in like manner, at the bottom of the thigh, a little above the knee, there must be fastened another napkin or sling, or else the girt of Hildanus, with a compress between it and the thigh; both these slings being drawn tight, the thigh is to be extended, but that not vehemently, but only so much as is sufficient to draw the bone out of its sinus, that it may be replaced into its proper acetabulum by the surgeon's hands; to this purpose the surgeon is, with one hand, to press the head of the thigh-bone outward, while the other conducts the knee inward. Or the reduction may be made by napkins fastened about the thigh near its extremities, in the manner of slings, and the limb extended that way, the knee being at the same time pressed inward by the hands.

If these methods are not sufficient, it will be necessary to have recourse to the polyspaston, or pulley, well known to the surgeons on these occasions. This is to be the method of reduction of the thigh-bone when it is dislocated forward; but when it is found to be luxated backward, the patient is to be placed flat on a table, with his face downward; the thigh is then

then to be extended more strongly than in the former case, and the reduction is to be performed by the surgeon's hand, an assistant all the while turning the limb somewhat inwards; and by this method the head of the thigh-bone generally slips very readily from this sort of dislocation into its proper place. The limb is then to be secured with proper bandages, and the patient to be kept to his bed for three or four weeks.

THIMBLE, an instrument made of brass, silver, iron, &c. put on the finger to thrust a needle through any cloth, silk, &c. used by all seamstresses, tailors, &c. The common thimbles are generally made of shuff and old hammered brass. This they melt, and cast in a sort of sand, with which and red ochre are made moulds and cores. They are cast in double rows, and when cold taken out, and cut off with greasy shears. Then the cores being taken out, they are put into a barrel, as they do shot, and turned round with a horse till they rub the sand one from another: from thence they are carried to the mill to be turned first on the inside and afterwards on the outside: then some saw-dust, or filings of horn combs, are put half way into each thimble, and upon it an iron-punch; and then with one blow against a studded steed the hollow of the bottom is made: after this, with an engine, the sides have the hollow made: this done, they are again polished on the inside: then the rim is turned at one stroke: and lastly, they are turned in a barrel with saw-dust, or bran, to scour them very bright. Iron thimbles, the thousand, pay, on importation, 11s. 6 $\frac{5}{8}$ d. and draw back, on exportation, 4s. 8 $\frac{5}{8}$ d. Brass thimbles, the thousand, pay, on importation, 14s. 4 $\frac{3}{8}$ d. and draw back, on exportation, 12s. 11 $\frac{5}{8}$ d.

THINKING, a general name for any act or operation of the mind. See **MIND**. Chauvinus, with the cartesianians, will have thinking to consist in a certain native inherent motion or agitation of the human mind, whereof itself is conscious; for they conceive it to be no other than the very essence of the mind itself, or at least its principal and essential property. All the materials of thinking are by Mr. Locke derived from the two sources of sensation and reflection. See the articles **SENSATION** and **REFLECTION**. The school philosophers usually divide thinking into intellectual and volitive.

Intellectual is subdivided into perception, judgment, reasoning, and method. Volitive thinking, or volition, admits of infinite different modifications, or new determinations. See the articles **PERCEPTION**, **JUDGMENT**, &c.

The doctrine of the cartesianians, who maintain that thinking is essential to the human soul, and that there is no time when the soul does not think, is overturned by Mr. Locke, who shews, that in sleep without dreaming, there is an entire cessation of all the modes of thinking. See the article **IDEA**.

THIRD, *tertius*. See the articles **NUMBER** and **NUMERATION**.

THIRD, in music, a concord resulting from a mixture of two sounds, containing an interval of two degrees:

It is called third, as containing three terms or sounds, between the extremes. The third, in Italian *terza*, in French *tierce*, in Latin *tertia*, has no general name in the Greek: it is the first of the imperfect concords, *i. e.* of such as admit of majority and minority, without ceasing to be concords. And hence it is distinguished into two kinds. The first which the Italians call *disono*, from the Greek *ditonos*, or *terza maggiore*, and the greater third, is composed diatonically of three terms or sounds, containing two degrees or intervals, one whereof, in the antient system, is a greater tone, and the other, a lesser tone; but in the modern temperate system, they are both equal, as *ut, re, mi*; or *ut, mi*. See the articles **INTERVAL** and **CONCORD**. Chromatically it is composed of four semitones, two whereof are greater, and the third less; it takes its form from the ratio sesquiquarta, 4 : 5.

The second third, which the Italians call *trihemituono*, or *semi-ditono*, or *terza minore*, and we lesser third, is composed like the former, of three sounds or terms and two degrees or intervals; but these degrees, diatonically, are only a greater tone and semi-tone.

Chromatically it is composed of three tones, two greater and one less; as *re, mi, fa*; or, *re, fa*.

It takes its form from the ratio sesquiquinta, 5 : 6.

Both these thirds are of admirable use in melody, and make, as it were, the foundation and life of harmony.

THIRD POINT, or **TIERCE POINT**, in architecture, the point of section in the vertex of an equilateral triangle.

Arche

Arches or vaults of the third point, called by the Italians *di tezo acuto*, are those consisting of two arches of a circle meeting in an angle a-top.

THIRDINGS, in the maror of Turfat, in the county of Hereford, is the third part of the corn or grain on the ground, due to the lord for a heriot, on the death of his tenant. See the article **HERIOT**.

THIRSK, a borough-town in the north-riding of Yorkshire, situated on the river Swale, sixteen miles north-west of York. It sends two members to parliament.

THIRST, *fitis*, an uneasy sensation, arising from a deficiency in the saliva to moisten the inward parts of the mouth; hence arise a strong desire for drink: it is a symptom generally attending feverish disorders.

THISTLE, *carduus*, in botany. See the article **CARDUUS**.

Order of the THISTLE, or of **St. ANDREW**, a military order of knighthood in Scotland, the rise and institution whereof is variously related by different authors: Lesley, bishop of Ross, reports, that the night before the battle between Athelstan king of Northumberland, and Hungus king of the Picts, a bright cross, in form of that whereon St. Andrew (the tutelar saint of Scotland) suffered martyrdom, appeared to Hungus, who having gained the victory, ever after bore the figure of that cross on his banners. Others assert, that Achaius king of Scotland, first instituted this order, after having made the famous league offensive and defensive with Charlemagne king of France. But although the thistle had been acknowledged as the symbol of the kingdom of Scotland from the reign of Achaius, yet some refer the beginning of this order to the reign of Charles VII. of France. Others place the foundation of it as low as the year 1500.

The chief and principal ensign is a gold collar composed of thistles and sprigs of rue interlinked with amulets of gold, having pendent thereunto the image of St. Andrew with his cross, and the motto, *NIMO ME IMPUNE LACESSET*. See plate **CCLXXIV**. fig. 4. n^o 1.

The ordinary or common ensign worn by the knights, is a star of four silver points, (*ib.* n^o 4.) and over them a green circle, bordered and lettered with gold, containing the said motto, and in the center is a thistle proper; all which is embroidered on their left breast, and worn with the collar, with a green ribband over the left

shoulder, and brought under the right arm; pendent thereto is the image of St. Andrew, with his cross, in a purple robe, within an oval of gold enamelled vert, with the former motto: but sometimes they wear, incircled in the same manner, a thistle crowned.

About the time of the reformation, this order was dropped, till James II. of England resumed it, by creating eight knights: however, the revolution unsettled it again, and it lay neglected till queen Anne, in 1703, restored it to the primitive design, of twelve knights of St. Andrew. King George I. in the first of his reign, confirmed the statutes signed by queen Anne, with the addition of several more, among which was that of adding rays of glory to surround the figure of St. Andrew, which hangs at the collar: and tho' from the reformation to George I. both elections and installments had been dispensed with, his majesty ordered that chapters of election should, for the future, be held in the royal presence; to which end he ordered the great wardrobe to provide the knights brethren, and officers, with such mantles as the statutes of the said order appointed.

THLASPI, **TREACLE-MUSTARD**, in botany, a genus of the *tetradynamia sili-culosa* class of plants, the corolla whereof consists of four petals, vertically ovated, and disposed in the form of a cross; the stamina are six filaments, about half the length of the cup; the fruit consists of a bilocular pod or capsule, narrowed at the base, and emarginated, and containing numerous seeds, affixed to two sutures. See plate **CCLXXVII**. fig. 1.

This genus comprehends the *bursa pastoris* of authors.

The seeds of the *thlaspi* agree in medicinal virtues with the common mustard. See the article **SINAPI**.

THLIPSIS, *ῥαψίς*, a compression of the stomach from food, which is offensive only by its quantity, and not endued with any remarkable quality; or from a conflux of humours, void of acrimony, into the part.

THOMÆANS, **THOMEANS**, **THOMISTS**, or *Christians of St. THOMAS*, a people of the East-Indies, who, according to tradition, received the Gospel from St. Thomas. Upon the arrival of the Portuguese at Calicut, in their first voyage to the Indies, they met with ancient christians, who pretended to be descended

from those converted by St. Thomas. The thomæans being informed of a new people arrived among them, who bore a particular veneration for the cross, sent ambassadors to them, to make an alliance with them, and to solicit their assistance against the gentile princes, by whom they were greatly oppressed. A mixture of opinions, with a total interruption of pastors, sometimes for several years together, occasioned that horrible chaos their religion was in, at the arrival of the Portuguese; for a specimen whereof we shall add their manner of celebrating the eucharist: over their altar was a kind of gallery; and while the priest was saying the beginning of the office below, a cake of flour of rice was frying in oil, or butter, above; when enough, the cake was let down in a basket upon the altar, where the priest consecrated it: as to the other species, for wine they used a kind of brandy or arrack, variously prepared in that country. Nor, was their ordination much more regular; the archdeacon, who was sometimes more respected than the bishop himself, frequently ordained priests: their other abuses were infinite. The Portuguese, for these two last centuries, have laboured the reformation of this church, and have employed both the ecclesiastic and secular power therein: for this end they have called the thomæan bishops to the council at Goa, have instructed, charged them, &c. and even sent them for instruction to Portugal and Rome; but finding that they were still apt to relapse at their return, and that no good was like to be done with them, they resolved to exclude them once for all, and to appoint an european bishop in their room. These proceedings have rendered the Portuguese infinitely odious to the thomæans.

St. THOMAS, a city of the hither India, on the coast of Coromandel, three miles south of Fort St. George; subject to the Portuguese.

St. THOMAS is also an island in the Atlantic ocean, situated under the equator, in 8° east long.

St. THOMAS is also a town of Guiana, in South America, situated on the river Orinoko; subject to Spain.

St. THOMAS'S DAY, a festival of the christian church, observed on Dec. 21. in commemoration of St. Thomas the apostle.

St. Thomas of Canterbury's day, a festival of the romish church, observed on Dec. 29. in memory of Thomas Becket arch-

bishop of Canterbury, who was murdered, or, as the romanists say, martyred, in the reign of king Henry II.

St. THOMAS'S HOSPITAL. See the article HOSPITAL.

THOMISM, or **THOMAISM**, the doctrine of St. Thomas Aquinas, and his followers the thomists, chiefly with regard to predestination and grace. There is some doubt what the true genuine thomism is, but there are authors who distinguish the thomism of St. Thomas from that of the dominicans. Others again make thomism no other than a kind of jansenism disguised: but jansenism, it is known, has been condemned by the popes, which pure thomism never was: in effect, the writings of Alvarez and Lemos, who were appointed by their order to lay down and defend, before the holy see, the dogmata of their school, have since been reputed the rule of pure thomism. The modern school has abandoned many of the antient thomists, whose sentiments and expressions appeared to Alvarez too hard; and the new thomists, who pass the bounds marked by these two doctors, cannot give their opinions for the sentiments of the school of St. Thomas, which the pope has forbid being censured. Those two authors distinguish four classes of thomists: the first, which they reject, destroys or takes away liberty; the second and third do not differ from Molina; the last, which Alvarez embraces, admits of a physical premotion or predestination, which is a complement of the active power, whereby it passes from the first act into the second, that is, from complete and next power to action. The premotion they hold is offered in sufficient grace, sufficient grace is given to all men, and that they have a complete independent, next power not to act, and even to reject the most efficacious grace.

THOMISTS, a sect of school-divines, who maintain thomism. See the preceding article.

THORACIC, *thoracicus*, a name given to two branches of the axillary artery, on account of their conveying the blood into some parts of the thorax. See **THORAX**. The thoracic arteries are distinguished into upper and lower. There are likewise thoracic veins, upper and under, destined for the conveyance of the blood from the thorax to the axillary vein.

THORACIC DUCT, or **CHYLIFEROUS DUCT**, a very slender canal, receiving the chyle from the chyliferous vessels, and the lymph

lymph from the lymphatics, and carrying them to the thorax, and usually through it to the subclavian vein. The beginning of this duct is in the reservoir or receptaculum chyli, which is situated in the left side of the upper vertebra of the loins, under the aorta, and the vessels of the left kidney; the rest of the duct has some resemblance of a sack or bag, and is larger and more irregular in its figure. Its end is usually in the subclavian vein; sometimes in the jugular. In dogs, and many other animals, its progress is under the aorta; but in the human body it ascends along the right side of the vertebra of the back, and passes between the aorta and the vena azygos, sometimes with a simple trunk, sometimes divided into two: its breadth, where divided, is about that of a wheat-straw. The best manner of demonstrating it in animals, is to feed a dog well, and then to strangle him; and as soon as the body is opened, to tie it up with a thread in the breast, just by the subclavian; by this means the cistern, or receptacle of the chyle, and the chyloferous vessels and lymphatics are all exposed evidently to view at once. In a human body they may also be observed any time after death, by injecting, according to Salzmann, wax, or any fluid, or indeed only by inflating the great lymphatic vessel, which runs by the left emulgent vein; or otherwise, if, according to Henninger, an injection, or barely an inflation, be made into a lacteal of the second order, to be traced out in the middle of the mesentery; or, finally, if the pleura be carefully cut between the aorta and the vena azygos, the duct will usually be easily found there. It is composed of a fine, thin, and pellucid membrane, and within it there are valves, as in the lacteals and lymphatics, which prevent the reflux of the chyle. There are more of these in the human body than in beasts; and, finally, there is a semilunar valve, closing its extremity under the subclavian. The use of the thoracic duct is to carry the chyle to the blood, through the thorax, as it receives it from the receptacle, and with it the lymph from the lymphatics.

THORAX, in anatomy, that large part of the body situated between the abdomen and the neck. See the articles **ABDOMEN** and **NECK**.

The parts of the thorax are of two kinds, the continent or containing, and contained: the continent parts, or those which

form the cavity, are either common, or proper; the common continent parts of the thorax are the cuticula, the cutis and the pinguello. See **CUTICLE**, &c.

The continent parts proper or peculiar to the thorax, are these; the breasts, the pectoral muscles, the intercostals, the diaphragm, the pleura; and, finally, the bones; of these last there are twenty-four ribs, the sternum, and twelve vertebrae. See the articles **BREASTS**, **PECTORALIS**, **INTERCOSTALS**, **DIAPHRAGM**, &c.

The contents of the cavity formed by these, or the parts contained in the thorax, are the mediastinum, the lungs, the heart and its pericardium, with the large vessels arising from it, particularly the trunks of the aorta, and the pulmonary artery of the vena cava and pulmonary vein, the thoracic duct, and, finally, the greater part of the œsophagus. See the articles **MEDIASTINUM**, **LUNGS**, **HEART**, **PERICARDIUM**, &c.

The uses of the parts of the thorax in general, are their serving to respiration and the circulation of the blood, in both sexes; and in women, to the producing milk. See the articles **RESPIRATION**, **CIRCULATION**, and **MILK**.

Wounds of the THORAX, are, by Heister, divided into three sorts. The wound is inflicted either upon the external parts of the thorax; or else it penetrates into the cavity of the thorax, without injuring any of its contents; or, lastly, the contents of the thorax also partake of the wound. That the wound terminates in the exterior parts, and does not penetrate into the cavity of the thorax, may be discovered by several methods, as by the sight, by hearing whether any sound proceeds from the wound at the time of inspiration, by feeling whether the finger or probe meets with any resistance in attempting to pass it into the cavity of the thorax; by injecting warm water, which, in this case, will return upon you; by the absence of bad symptoms, which always attend a wound that penetrates. When, by these methods, you are fully satisfied that it does not penetrate, it may be dressed with a digestive ointment, or some vulnerary balsam, and treated according to the method directed in the cure of slight wounds. See the article **WOUND**.

But when the wound penetrates into the thorax, and a large quantity of blood falls into the cavity thereof, then the office of respiration, and the course of the blood through the lungs, will certainly

be impeded; and the blood, by frequent delays and obstructions, being entirely inspissated in the lungs, life can no longer be supported: but where the quantity of extravasated blood is not large enough to obstruct the lungs in their office, the chief danger that the patient labours under, is that the extravasated blood should putrify by degrees, and corrupt the contents of the thorax, which will bring on very bad symptoms, and in a short time death. The following symptoms discover an extravasation of blood in the thorax: if there is a great difficulty of breathing except when the patient is placed in an erect posture; if the patient lies easiest upon his back, or wounded side; if he feels a weight upon the diaphragm; if he perceives the undulation of a fluid upon turning the body round; and, lastly, if there has been little or no discharge of blood by the wound. When it appears by these symptoms that there is a collection of blood in the thorax, the greatest diligence is required to get it out; therefore when the wound is inflicted upon the middle or lower part of the thorax, and has not a very narrow opening, it will be convenient to lay the patient upon the wounded side, advising him to fetch his breath as deep as he can, or to cough. If the current of blood is obstructed by any thick grumous parts, they must be removed with a probe or the finger, or drawn out with a syringe. If the blood is become too thick to flow out of the wound, attenuating injections must be used, made of a decoction of barley-water, with the addition of some common honey, or honey of roses, and a small quantity of soap; this is to be injected into the cavity of the thorax, and then the patient is to be so situated as to let it run out again: this operation is to be repeated, till it appears that all the grumous blood is washed away. But if the wound is so narrow or oblique, that this method cannot be prosecuted, the wound should be enlarged, being careful not to fatigue the patient too much, by endeavouring to discharge all the extravasated blood at one time, keeping the wound open, dressing it with proper plasters and compresses, securing the whole with a scapulary, and repeating this method of dressing, till the discharge shall entirely cease, and the external wound can be conveniently healed. When a wound is made in the upper part of the breast, no posture will satisfy the intention of discharging the extravasated

blood, but standing upon the head; an opening ought therefore to be made in the lower part of the thorax, called paracentesis. See the article PARACENTESIS.

The cavity of the thorax being thus cleansed, the wound is to be dressed but once every day: each dressing should be performed with all possible expedition, and the utmost diligence should be used to guard the contents of the thorax from the external air. At the time of dressing, a chaffing-dish of hot coals should be held near the wound, to warm and thin the air; and if too great a quantity of air is already got into the cavity of the thorax, it must be drawn out with a syphon. When any of the contents of the thorax are wounded, as the heart, the aorta, the vena cava, the pulmonary artery or vein, the mediastinum, or a large portion of the lungs, death comes too suddenly to give the surgeon room to exercise his art. On the other hand, when the lungs are only slightly wounded, that is, when only the small ramifications of the pulmonary vein and aspera arteria are divided, the case is very dangerous, but not always mortal; though persons who recover after wounds of this kind, are more obliged to the soundness of their constitution, than their surgeon's skill.

THORN, a city of Poland, in the province of regal Prussia, situated on the river Vistula: east longitude 19°, and north latitude 52° 40'.

THORNBACK, in ichthyology, the prickly raia, with tuberculose teeth, and a transverse cartilage in the belly. See the article **RAIA**.

The head and body are very flat and depressed; the figure of the body, exclusive of the tail, is nearly square; the tail is long and slender, but a little depressed or flattened; the belly is altogether plane; the back in general is plane, but rises a little in the middle into a convexity; the eyes stand on the uppermost part of the body, at a considerable distance from the rostrum, and are a little protuberant, and covered with a simple and naked skin; behind each eye there is a single oblong foramen, that runs transversely, and its anterior side is striated, and serves as a valve to close up almost the whole aperture; the mouth is situated on the under side of the body, and lies in a transverse direction, is very large, and stands at the same distance from the extremity of the rostrum as the eyes do.

THORN-

THORNBURY, a market-town of Gloucestershire, situated twenty miles south-west of Gloucester.

THORNEY-ISLAND, an island made by the branches of the Thames formerly, where Westminster-abbey now stands.

THORNEY-ISLAND is also an island situated in a bay of the East channel, between Chichester and Portsmouth.

THOUGHT, or **SENTIMENT**, a general name for all the ideas consequent on the operations of the mind, and even for the operations themselves. See the articles **IDEA** and **THINKING**.

THOULON, or **TOULON**, a port-town of Provence, in France, situated on a bay of the Mediterranean sea: east long. 6°, and north lat. 43° 5'.

THOULOSE, or **TOULOSE**, a city of France, capital of the province of Languedoc; situated on the river Garonne: east long. 1° 5', and north lat. 43° 40'.

THRACE, a province of European Turkey, situated on the north side of the Propontis.

THRASHING, or **THRESHING**, *flagellatio*, in agriculture, the art of beating the corn out of the ears. See **CORN**.

There are two ways of separating corn from the ear; the first by beating it with a flail, which is properly what is called thrashing. The other method, still practised in several countries, is to make mules, or horses, trample on it, backwards and forwards; this is properly what the ancients called tritura and trituration. The Hebrews used oxen therein, and sometimes yoked four together for this purpose. Another way among the ancients was with a kind of sledge, made of boards joined together, and loaden with stones or iron, upon which a man was mounted, and the whole drawn over the corn by horses: this instrument was called traha, or tribula. It is a rule among husbandmen, that the season for thrashing, is as soon as the corn has sweated in the heap or mow.

THRAVE, or **THRAVE** of corn, twenty-four sheaves, or four shocks of six sheaves to the shock; though, in some countries, they only reckon twelve shocks to the thrave.

THRAUSTOMITCHES, in natural history, the name of a genus of compound earths, the bodies of which are loams composed of sand and a less viscid clay, and are therefore of a friable or crumbly texture. See the article **EARTH**.

The earths of this genus are generally

used to make bricks, and there are several species of them. 1. A whitish one, dug in great plenty in Staffordshire, and some other counties. 2. A brownish white one, very plentiful about London. 3. A pale yellow one, common in most parts of England, at small depths. 4. A sharp rough one, of a deep yellow, dug near the town of Hedgerly, near Windsor, and commonly called Windsor-loam; it is not found in any other place, and is of great value; it makes the bricks used for the iron-furnaces, and serves at the glass-houses; and among the chemists, as a very strong and valuable lute; and is not only used in England, but carried to Holland and Germany, and many other parts of the world. 5. A deep, dusky, yellow one, dug in most parts of England, near the surface. 6. A hard, brown one, found at some depth in Buckinghamshire, and usually found full of small shells; it is used for covering the ridges of barns, and copings of walls; and makes very firm and durable barn-floors. 7. A light, pale, brown one, the loosest and most friable of all the species, used in many places for making the bell-founders moulds. 8. A yellowish brown one: this is common in most parts of the kingdom, and makes the fine red bricks, used for ornamenting buildings.

THREE, *Rule of*. See the article **RULE**.
THRENODY, *threnodia*, a mournful or funeral song.

THRICHECHUS, the **SEA-COW**, in zoology, a genus of sea-animals, of the order of the plagiuri, the characters of which are, that it has teeth in both jaws; there is no fin upon the back, and the skin is very tough, firm, and hairy. This creature seems to be the link uniting the fish and the quadruped-tribes, as the bat does the quadrupeds and birds: it grows to fifteen feet, or more, in length, and is considerably thick in proportion. The females have, between the pectoral fins, two large, round, and fair breasts, and both sexes have the parts of generation, and the navel perfectly resembling those of the human species: there is no doubt, but all the fables concerning mermaids, mermen, and syrens, took their rise from an imperfect view of this animal.

THRIPS, in the history of insects, a genus of the order of scleroptera, having the rostrum obscure, the body of a linear figure, and the wings four in number, being

being incumbent on the back, and strait. It is an extremely small insect, not equal to a flea in size.

TROAT, the anterior part of an animal, between the head and the shoulders, wherein is the gullet. See the article **OESOPHAGUS**.

For diseases of the throat, see the articles **QUINSEY**, **TONSILS**, &c.

TROAT, in architecture, fortification, &c. See the article **GORGE**.

THRONE, *Sponsus*, a royal seat, or chair of state, enriched with ornaments of architecture and sculpture, made of some precious matter, raised on one or more steps, and covered with a kind of canopy. Such are the thrones in the rooms of audience of kings, and other sovereigns.

THROWSTER, one who prepares raw silk for the weaver, by cleansing and twisting it.

THRUPTOMICTHES, in natural history, a genus of earths, consisting of moulds of a lax, friable texture. See the articles **EARTH** and **MOULD**.

Of this genus there are only two species.

1. The red thruptomicthes, frequent in many countries: but no where more plentifully than about Rowel, in Northamptonshire: it is accounted a very fertile good land, and, particularly, succeeds with crops of rye, barley, or pease. 2. The friable, brown thruptomicthes, frequent in Sussex, and in many other parts of the kingdom, and is generally accounted a poor, barren land.

THRUSH, in ornithology, two species of *turdus*, the one called the common thrush, and the other the missel-thrush. See the article **TURDUS**.

The common thrush is the *turdus* with a white line over the eyes. This is smaller than the fieldfare; the head is small and flattened; the eyes are bright, their iris hazel; the ears patulous; the beak about half an inch long, brown and pointed; the head and back of an olive brown, spotted with a dark colour; the breast is yellow, the belly whitish, and the legs brown.

The other species of *turdus*, called the missel-thrush, is of a greyish yellow colour with a spotted breast, being the largest of the *turdus* kind.

THUIN, a town of the county of Namur, situated on the river Sambre, near the confines of Hainault, nine miles south-west of Charleroy.

THULE, of the antients, supposed to be the islands of Orcades.

THUMB, *pollex*, in anatomy, one of the parts or extremities of the hand. See the article **HAND**.

The thumb, considered separately, has bones thicker than those of the fingers; the first of these agree in all respects with those of the metacarpus, in figure, situation, and articulation; but in its motion it is widely different. The articulation of the first with the second, and of the second with the third, are like the articulations and motions of the second and third phalanges of the other fingers. See the articles **FINGERS** and **PHALANX**.

THUMMIM, in the scripture-learning. See the articles **URIM** and **THUMMIM**.

THUNDER, a noise in the regions of the air, excited by a sudden kindling of sulphureous exhalations.

Those philosophers who maintain, that vapours are buoyed up in the air by particles of fire adhering to them, account for the phenomena of thunder and lightning in the following manner: they suppose that from the particles of sulphur, nitre, and other combustible matter, which are exhaled from the earth, and carried into the higher regions of the atmosphere, together with the ascending vapours, is formed an inflammable substance, which, when a sufficient quantity of fiery particles is separated from the vapours, by the collision of two clouds, or otherwise, takes fire, and shoots out into a train of light, greater or less, according to the strength and quantity of the materials. This opinion is certainly false; for it is impossible the vapours should be attended with such fiery particles as is here supposed: neither have we occasion to fly to such an hypothesis; for as vapours, exhaled from the surface of the water, are carried up into the atmosphere, in like manner the effluvia of solid bodies are continually ascending thither. Now we find by experiment, that there are several inflammable bodies, which, being mixed together in due proportion, will kindle into flame by fermentation alone, without the help of any fiery particles. See the articles **FERMENTATION**, **LIGHTNING**, &c.

Thus, M. Lemery having covered up, in the earth, about fifty pounds of a mixture, composed of equal parts of sulphur and filings of iron, tempered with water; after eight or nine hours time the earth,

earth, where it was laid, vomited up flames. Thus also, mix a small quantity of gun-powder with oil of cloves, pour gently upon this mixture two or three times as much spirit of nitre, and you will observe a bright inflammation suddenly arising from it. A mixture of the two fluids alone will take fire, the powder is added only to augment the inflammation. When, therefore, there happens to be a mixture of the effluvia of such bodies floating in the air, they ferment, kindle, and, flashing like gun-powder, occasion those explosions and streams of fire, which we call thunder and lightning.

As to the particular species of the effluvia, which compose this mixture, that cannot be exactly determined: they are thought to be chiefly sulphureous and nitrous; sulphureous, because of the sulphureous smell which lightning generally leaves behind, and of that sultry heat in the air, which is commonly the forerunner of it; nitrous, because we do not know of any body liable to so sudden and violent an explosion as nitre is.

Dr. Lister is of opinion, that the matter both of thunder and lightning, and also of earthquakes, is the effluvia of the pyrites; as he does, that the matter of volcanos is the pyrites itself. This is a mineral that emits copious exhalations, and is exceeding apt to take fire upon the admission of moisture. See the doctor's defence of his notion in the Phil. Trans. n° 157. He thinks this may be the reason why England is so little troubled with earthquakes, and Italy, and almost all places round the Mediterranean sea, so very much, viz. because the pyrites are rarely found in England; and, where they are, they lie very thin, in comparison of what they do in those countries; as the vast quantity of sulphur emitted from the burning mountains there, seems to shew.

The effects of thunder and lightning are owing to the sudden and violent agitation the air is put into thereby, together with the force of the explosion; and not to thunderbolts falling from the clouds, as is supposed by the vulgar.

Some are inclined to think, that thunderbolts are artificial, and that they were applied by the antients to some use. What confirms them in their opinion is, that they are found more frequently where sepulchres have been, than in other places.

The distance the thunder is from us, may nearly be estimated by the interval of time between our seeing the lightning, and hearing the thunder; for as the motion of light is so very quick, that the time it takes up in coming to us from the cloud, is not perceptible; and as that of a sound is about a thousand feet in a second; allowing a thousand feet for every second that passes between our seeing the one, and hearing the other, we have the distance of the cloud, pretty nearly, from whence the thunder comes. See the article LIGHT and SOUND.

THUNDERING LEGION, *legio fulminans*, was a legion in the roman army, consisting of christian soldiers, who, in the expedition of the emperor Marcus Aurelius against the Sarmatæ, Quadi, and Marcomanni, saved the whole army then ready to perish of thirst, by procuring, with their prayers, a very plentiful shower thereon, and at the same time a furious hail, mixed with lightning and thunderbolts, on the enemy. See the article LEGION.

This is the account commonly given by ecclesiastical historians, and the whole history is engraven in bass-reliefs on the antonine column. And hence arose the denomination thunderers, tho' some say, that the legion, those christians were of, was called the thundering legion before.

THURINGIA LANGRAVATÉ, one of the divisions of the circle of Upper Saxony, in Germany, having the dutchy of Magdeburg on the north, and Franconia on the south.

THURSDAY, the fifth day of the christian week, but the sixth day of that of the Jews. See DAY and WEEK.

Holy THURSDAY, the same with ascension-day. See the article ASCENSION.

Maunday - THURSDAY. See the article MAUNDAY-THURSDAY.

THURSO, a port-town of Cathness, in Scotland, situated on the Caledonian ocean, fifteen miles south-west of Dungenby-head.

THUYA, *arbor vitæ*, in botany, a genus of the monoecia-monadelphia class of plants, having no corolla; the fruit is an ovato-oblong obtuse cone, opening longitudinally, with oblong squamæ almost equal, obtuse and convex on the outside.

THYITES, in the materia medica, the same with the lapis morochthus. See the article LAPIS.

THYMUS, in botany, a genus of the *didynamia-gymnospermia* class of plants, the corolla of which consists of a single ringent petal; the tube is of the length of the cup; the faux is small; the upper lip is short, plane, erect, emarginated, and obtuse; the lower lip is long, patent, trifid, obtuse, and broader in the middle lacinia; there is no pericarpium; the seeds are four, small and roundish, and are contained in the cup.

This genus, among other species, comprehends the herb *maftich*, the common garden-thyme, the cretic thyme, the common wild thyme, &c.

The common thyme has an agreeable aromatic smell, and a warm pungent taste, which it imparts by infusion to rectified spirit, and sends over, in distillation with water; along with the water arises an essential oil, extremely hot and pungent; this distilled spirit is an agreeable aromatic cordial liquor, not inferior to any thing of this kind.

THYMUS, in anatomy, a gland, which in infants is very remarkable: it is situated in the upper part of the thorax, immediately under the sternum, and lies upon the pericardium, and on the trunk of the aorta, and of the vena cava. It extends itself from the pericardium, along the trunk of the aorta, to the beginning of the carotids, sometimes so far as to the thyroide-gland; its figure is irregular and uncertain; its colour in infants is pale red, in adults it is of a dusky hue: it is much larger in infants newly born, than in subjects at any more advanced period. Its length is there no less than three fingers breadth, and its diameter two, its thickness is about half a finger: it gradually decreases from this size, as the child grows up; in adults it is very small, and in old people it entirely disappears. Its substance is glandulous and conglomerate, and it is surrounded by a membrane. It has blood-vessels sometimes from the subclavians, sometimes from the mammary, and sometimes from the mediastine ones; and in some subjects from the carotids and jugulars. Its lymphatics sometimes run to the thoracic duct, sometimes to the subclavian veins; and they have in general no valves. The nerves of the thymus are from the *par vagum*, or from the intercostals. There is sometimes a milky juice found in this gland, in new-born subjects. It has no excretory duct hitherto discovered, and its use is therefore not certainly

known: possibly, according to Heister, it serves to secrete lymph, which it discharges into the thoracic duct, for the dilution of the blood and of the chyle, as the glands of the mesentery, and of the pancreas do, in regard to the chyle. On this supposition its use is much greater in the foetus, than at any time after the birth, because the want of respiration in that state may well be supposed to subject the blood to be thicker, and to need more dilution than afterwards; nothing tending to attenuate blood so much as respiration. Bellinger is of opinion, that it prepares a nutritious fluid for the foetus while in the uterus, and conveys it by particular ducts to its mouth; but it is to be observed, that neither Bellinger himself, nor any body since, have ever been able to find but these ducts. See the article **FOETUS**.

That our readers may be enabled to form a distinct idea of this remarkable gland, we have given two views of it, as found in two foetuses, just born; see plate **CCLXXVII. fig. 2. n° 1. and 2.** where **AA** is the heart, surrounded by its pericardium; **BB**, the gland thymus, divided in the upper part into two or three portions, **aa**; **CCC**, the three ascending branches of the aorta.

THYMUS, in medicine, is used for a kind of wart growing on the parts of generation, the fundament, and several other parts of the body. See the articles **CONDYLOMA, WART, WEN, &c.**

The ordinary method of curing a thymus, is by ligature and desiccative lotions, or by caustics; and if large, by incision, taking care first to secure the greater vessels, by tying them.

THYROARYTÆNOIDES, in anatomy, a muscle of the larynx, which, arising and terminating in it, serves, together with the *arytenoides*, to constrict it. These two muscles mutually intersect one another, and straiten the glottis; sometimes there is but one muscle; and sometimes it is different from that described here.

THYROIDE GLAND, in anatomy, is of a very singular figure, resembling that of the new moon. It adheres by its middle part, which is called by authors its *isthmus*, to the upper ring of the trachea, and its points or horns are turned upwards. It adheres on each part to the larynx and oesophagus.

THYROIDE CARTILAGE, one of the five cartilages that principally compose the larynx.

Fig. 2. THYMUS.



Fig. 1. THLASPI.



Fig. 3. The TIGER.



Fig. 4. TILIA.





Iarynx. The thyroide is the first of these cartilages, and is also called the scutiform cartilage, being of a quadrangular figure, and standing in the anterior part, where the *pomum Adami*, as it is usually called, makes its prominence, and the largest of the other five cartilages.

THYROSTAPHYLINUS, in anatomy, the name of a muscle of the *uvula*, which, arising from the lateral part of the thyroide cartilage, and ascending towards the *uva*, becomes larger and is inserted in manner of an arch, in the side of the *velum palatinum*.

THYRSUS, in antiquity, the sceptre which the poets put into the hand of *Bacchus*, and wherewith they furnished the *menades* in their *bacchanalia*. See the articles *BACCHANALIA*.

The *thyrsus* was originally a lance or spear wrapped up in vine-leaves, wherewith *Bacchus* is said to have armed himself and his soldiers in the indian wars, to amuse and deceive the unpractised *Indians*, and make them expect no hostilities.

Hence, it was afterwards borne in the feasts and sacrifices of that god; and as the *satyrs*, who were *Bacchus's* soldiers, were supposed to have fought with it, it became a custom to represent them therewith.

TIARA, an ornament or habit wherewith the antient *Persians* covered their head, and which the *Armenians*, and kings of *Pontus*, still wear on medals; these last, because descended from the *Persians*.

TIARA is also the name of the pope's triple crown; antiently called *regnum*.

TIBER, a great river of Italy, which runs through the pope's territories, passing by *Perugia* and *Orvietto*; and having visited *Rome*, falls into the *Tuscan sea* at *Ostia*, fifteen miles below that city.

TIBIA, in anatomy, is the inner and bigger bone of the leg, called also *os falcis* majus: it is hard and firm, with a cavity in its middle; it is almost triangular; its fore and sharp edge is called the shin. In its upper extremity it has two large sinuses, tipped with a soft and subtle cartilage, called *cartilago lunata*, from its figure. It runs in between the extremities of the two bones, and becomes very thin at its edge, like those in the articulation of the lower jaw. It facilitates a small side motion of the knee. The sinuses receive the two protuberances of the thigh-bone, and the production which is between the sinuses of the tibia, is received

in the sinus, which divides these two protuberances of the femur. By bending our knee, we bring our leg, in walking, in a straight line forwards, which, without this articulation, we could not have done: but, like those who have the misfortune to have a wooden leg, we must have brought our foot about in a semicircle, in going even upon a plain, but more evidently upon a descent. On the side of this upper end it has a small knob, which is received into a small sinus of the fibula; and, on its fore part, a little below the *patella*, it has another, into which the tendons of the extensors of the leg are inserted. Its lower extremity, which is much smaller than its upper, has a remarkable process which forms the inner angle, and a pretty large sinus divided in the middle of a small protuberance; the sinus receives the convex head of the same bone. It has another shallow sinus in the side of its lower end, which receives the fibula.

The tibia has four extensor muscles, as the *rectus*, *cruralis*, *vastus*, &c. and five flexors, *viz.* the *gracilis*, *semi-membranosus*, *semi-nervosus*, *biceps*, and *popliteus*. See the article *RECTUS*, &c.

TIBIALIS, or *TIBIÆUS*, in anatomy, the name of two muscles of the foot, distinguished by the epithets *anticus* and *posticus*. The *tibialis anticus*, one of the flexor muscles, has its origin from the superior and extensor surface of the tibia, and is terminated at the internal *os cuneiforme*, and the interior part of the internal metatarsal bone. The *tibialis posticus*, or *adductor-muscle* of the foot, has its origin in the upper part of the *interosseous ligament*, and its termination in the *os naviculare*. See the articles *FOOT* and *MUSCLE*.

TIBICEN, in ichthyology, the same with the *lyra* or *harp-fish*, a species of *trigla*. See the articles *LYRA* and *TRIGLA*.

TIBISCUS, a river otherwise called *Teiss*. See the article *TEISS*.

TICK-TACK, a game with dice and tables, wherein all the men are placed on the ace-point.

The great art of this game consists in securing the six and cinque point; which ought never to be broken, unless for the advantage of going in, or a hit, which last is, when you throw such a cast that some of your men will reach your adversary's unbound.

Playing close at home is the safest way; taking care to find your men, and giving your

your adversary a single game, when in danger of losing a double one.

TICKHILL, a market-town in the west riding of Yorkshire, thirty-three miles south of York.

TICKLING, says M. le Cat, is, in respect to the sense of feeling, what an hermaphrodite is in respect to sexes: it partakes equally almost of pleasure and pain; making one laugh, at the same time that it is intolerable; and if carried too far, frequently has bad and even fatal effects. In this sensation, the organs of feeling are affected with a light tremulous motion, which occasions all voluptuous sensations; but more lively in its degree and smarter, than that which usually attends on pleasure: it proceeds from that gentle friction, which is distinguished from all other impressions on the organs, by the name of titillation.

TICKLISH, in the manege. A horse is said to be ticklish, that is too tender upon the spur, and too sensible; that does not freely fly the spurs, but in some measure resists them, throwing himself up, when they come near and prick his skin. A ticklish horse has somewhat of the ramingues, *i. e.* the kickers against the spurs; but with this difference, that the latter put back, leap and kick, and yerk out behind, in disobeying the spurs; whereas a ticklish horse only resists for some time, and afterwards obeys, and goes much better, through the fear of a vigorous ham, when he finds the horseman stretch his leg, than he does upon being actually pricked.

TIDDESWAL, a market-town of Derbyshire, eighteen miles north-west of Darby.

TIDES, two periodical motions of the waters of the sea, called the flux and reflux, or the flow and ebb.

The cause of the tides is the attraction of the sun and moon, but chiefly of the latter; the waters of the immense ocean, forgetful, as it were, of their natural quietus, move and roll in tides, obsequious to the strong attractive power of the moon, and weaker influence of the sun. See the articles **ATTRACTION** and **GRAVITATION**.

To illustrate this, let **NESQ** (plate **CCLXXVIII**. fig. 1.) represent the earth, covered over with water **ABDF**; **NS** the axis of the earth, **EQ** the equator, **TR** the tropic of cancer, *tr* the tropic of capricorn, **M** the moon in her orbit, **S** the sun in his. Now since all bodies are endued with an attracting vir-

tue, the moon will attract all the water in the nearest hemisphere **FAB**, with degrees of force which are inversely the squares of the distances from all parts and therefore with the strongest force where the distance is least, *viz.* in the point **A**, directly under her: and the attraction being in this hemisphere contrary to that of the earth, the water of all parts from **B** to **F** towards **A** will have its gravity decreasing, and be highest all at the part **A**; and consequently must there stand higher than at the point **B**, where being more attracted by the earth it must be heavier and nearer to the center, as is evident from the laws of hydrostatics. See the article **FLUID**.

Again, in the hemisphere **FDB**, the attraction of the moon conspires with that of the earth; but decreasing as the squares of the distances increase, the joint force of attraction will every where decrease from **F** and **B** towards **D**, the point opposite to the moon; where, again, the waters will be lightest, and therefore stand highest to preserve the equilibrium. Whence it appears, that by this sum and difference of the moon's and earth's attraction, there will necessarily ensue protuberance or swelling of the waters, which we call tides of flood, in the two points **A** and **D** directly under the moon. Also in the two points **F** and **B**, as the waters are there most attracted, so they will be heaviest, and consequently rise to the least height from the earth's surface, whence they are called tides of ebb, or the ebbing of the water.

If to the power of the moon we add that of the sun, we shall have the tides considerably augmented at the conjunction in **S**, or opposition in **H**, that is, at the new and full moons, which are called the spring-tides; as those which happen when the sun is at **O** or **P**, are called neap-tides, the waters at **A** and **D** being then lowest, because the attraction of the moon is then counterbalanced by that of the sun.

It is farther to be observed, that of the two tides of flood at **A** and **D**, that at **A** is greatest to any place **T** in northern latitude, when the moon is in the northern signs, and above the horizon: for the point **A** is then nearer the zenith of the place **G**, than the opposite point **D** is to the same place at **R** twelve hours afterwards; and, consequently, the height of the tide **TG** is greater than that of the opposite tide **Rg**. The contrary of this

T I D E S

Fig. 1.

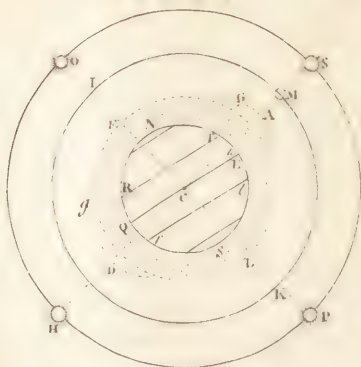


Fig. 2.

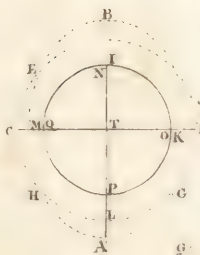


Fig. 3.

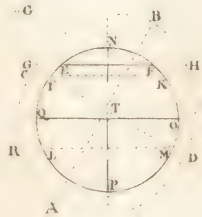


Fig. 4.

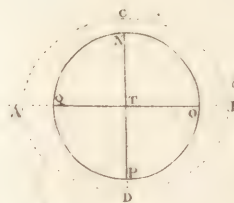


Fig. 5.

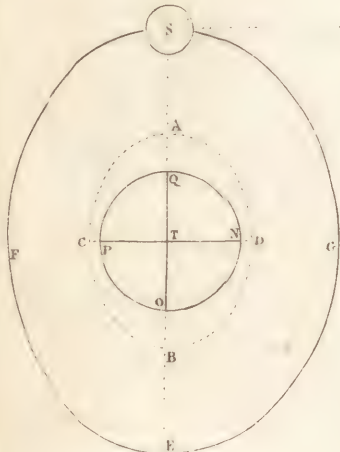
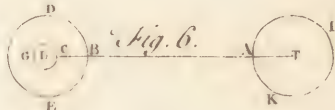


Fig. 6.





this happens, when the moon is in the southern signs.

That there are two tides of flood and two of ebb, succeeding each other alternately at about the interval of six hours, is obvious from the figure: and that they happen later each day near an hour, is owing to their exact correspondence to the motion of the moon, which daily culminates so much later. That they happen not when the moon is in the meridian, but about three hours after, is owing to the force of the moon being then greater than when in the meridian of any place; as the heat of the day is greater at three o'clock than at twelve; and the heat of the summer is greater in August, than at the 21st of June. Lastly, that the greatest spring-tides happen not at the 21st of March, and 23d of September, but in February and October, is because the sun being nearest the earth in December, his influence is then strongest, and so must quicken the time of the greatest vernal tides; and being weakest in June, the time of the autumnal tides will necessarily be retarded.

The sum of what has been said is this: if $NOPQ$ (*ibid.* fig. 2.) be the surface of the earth, T its center, $IFKGLHCE$ a circle representing the spherical surface of the waters covering the earth, and affected only by the attractive power of the earth: upon placing an attracting body at S , the waters will no longer continue their spherical figure, but be immediately drawn into the spheroidal figure $ACBD$, in such manner, as to be depressed at C and D to M and K , and elevated from L and I to A and B ; and the elevation AL or BI , is double the depression CM or DK . That if S be the sun, then $AP - OK = AL + KD = 25$ inches; or $11\frac{1}{2}$ feet, if S be the moon. That at the points E, F, G, H , (which are called the ostants) the water is neither elevated nor depressed. That if any other body be placed at O (as the moon) in the same right-line TS ; then by the joint influence of both S and O , the elevation at A and B will be increased, and the depression at C and D likewise. Lastly, if S be in the situation S , or vertical to the point D , it is plain its action to raise the water D will be directly contrary to that of the moon in depressing it there; wherefore the depression will not be so great as before; for the same reason the elevation at A and B will be diminished, being now only as the

difference of the two forces, whereas before they were as the sum.

We shall now consider the phenomena of the tides which remain; and first, it is evident, that if PN be the axis of the earth, and QO the diameter of the equator, then the moon situated at O , over one of the poles, would accumulate the water over each pole, and the spheroid would be so posited as to have its longest axis AB coinciding with the axis of the earth PN . In this position of the spheroid, it is plain, there could be no such thing as a tide in any part of the ocean over all the earth; for every section of the spheroid, parallel to the equator, would be a circle; consequently in any parallel of latitude, the water would be at an equal distance from the earth's surface every moment of the diurnal revolution, or natural day.

Suppose the moon were removed from the direction of the earth's axis, and posited at S (*ibid.* fig. 3.) then will the axis of the aqueous spheroid AB be turned towards S , and make an angle with the earth's axis, as ATP or BTN . Then we observe, that since C, D , are the places of lowest water, that parallel IK which passes through the point I on one side the equator, and LM which passes through M on the other, will divide the earth into three zones, in two of which, *viz.* ENK and LPM , there will be but one tide each day, of the same kind; for instance, in the parallel EF , a person at F will have high water, and at E low water for twelve hours after. Again, in all the zone $IKML$, there will be two tides of the same kind each day, as is evident from the figure. These limits, or the arch QI or OM , is the complement of the moon's declination from the equator.

If the moon at S (*ibid.* fig. 4.) be over the equator, the longer axis of the spheroid AB will now coincide with the plane of the equator QO , and the shorter axis CD with the axis of the earth NP . Here it is obvious, that in this situation of the spheroid, the waters in the parts AB , with respect to those at CD , will give the greatest difference of high and low water possible to all parts of the earth; and that there is no place but those two at the poles N, P , but what has two tides of flood, and two of ebb every twenty-four hours. And this difference of the flux and reflux will decrease from the equator to the poles.

It has been already observed, that the greatest

greatest elevation of the waters is not when the luminary is in the meridian, but about three hours after, because the motion communicated to the waters during the arrival of the meridian is not immediately destroyed, but remains some time, and receives a farther augmentation from that which is impressed for about three hours after. For the same reason, we observe, the greatest and least tides happen not on the day of the syzygy, or quadrature, but on the third or fourth after; the sum or difference of the forces of the luminaries not being till then at a maximum. See the article SYZYGY.

Let SFEG (*ibid.* fig. 5.) be the orbit of the moon about the earth QNOP, which as it is not circular but elliptical, the center of the earth T will not be always at an equal distance from the moon; but the moon will be sometimes nearest the earth, as when at S, and sometimes farthest off, as at E. The point S is called the perigæum, or perigee; and the point E the apogæum, or apogee. The power of the moon in her perigee is to that in the apogee nearly as TE^3 to TS^3 ; and consequently the greatest tides will be on the day of the perigee, or rather a few days after, for the reasons above-mentioned. Such would the tides regularly be, if the whole earth were covered with deep sea; but by reason of the shoalness of some places, and the narrowness of the streights, by which the tides are, in many places, propagated, there arises a great diversity in the tides not to be accounted for without an exact knowledge of all the circumstances of the several places where they happen; as of the position of the land, the breadth and depth of channels, &c.

That the tides may have their full motion, the ocean in which they are produced ought to be extended from east to west 90° , or a quarter of a great circle of the earth, at least; because the places where the moon raises most, and most depresses the water, are at that distance from one another. Hence it appears, that it is only in the great oceans that such tides can be produced; and why, in the large Pacific ocean, they exceed those in the Atlantic ocean: hence also it is obvious, why the tides are not so great in the torrid zone, between Africa and America, where the ocean is narrower, as in the temperate zones on either side; and from this also, we may understand why the tides are so small in islands, that

are very far distant from the shores. It is manifest, that, in the Atlantic ocean, the water cannot rise on one shore but by descending on the other; so that, at the intermediate distant islands, it must continue at about a mean height betwixt its elevation on the one and on the other shore.

As the tides pass over shoals, and run through streights into bays of the sea, their motion becomes more various, and their height depends on a great many circumstances. The tide, that is produced on the western coast of Europe, corresponds to the theory above described: thus, it is high water on the coast of Spain, Portugal, and the west of Ireland, about the third hour after the moon has passed the meridian: from thence it flows into the adjacent channels, as it finds the easiest passage. One current from it, for example, runs up by the south of England, and another comes in by the north of Scotland: they take a considerable time to move all this way, and it is high-water sooner in the places to which they first come; and it begins to fall at those places, while the two currents are yet going on to others that are farther in their course. As they return, they are not able to raise a tide; because the water runs faster off than it returns, till, by a new tide propagated from the ocean, the return of the current is stopped, and the water begins to rise again. The tide takes twelve hours to come from the ocean to London-bridge, so that, when it is high water there, a new tide is already come to its height in the ocean; and, in some intermediate place, it must be low water at the same time. In channels, therefore, and narrow seas, the progress of the tides may be, in some respects, compared to the motion of the waves of the sea. Our author also observes, that when the tide runs over shoals, and flows upon flat shores, the water is raised to a greater height than in the open and deep oceans that have steep banks; because the force of its motion cannot be broke, upon these level shores, till the water rises to a greater height.

If a place communicates with two oceans (or two different ways with the same ocean, one of which is a readier and easier passage) two tides may arrive at that place in different times, which, interfering with each other, may produce a great variety of phænomena. An extraordinary instance of this kind is mentioned

tioned by our author at Bathsha, a port in the kingdom of Tunquin in the East-Indies, of northern latitude $20^{\circ} 50'$. The day in which the moon passes the equator, the water stagnates there without any motion: as the moon removes from the equator, the water begins to rise and fall once a day; and it is high water at the setting of the moon, and low water at her rising. This daily tide increases for about seven or eight days, and then decreases for as many days by the same degrees, till this motion ceases when the moon has returned to the equator. When she has passed the equator, and declines towards the south pole, the water rises and falls again, as before; but it is high water now at the rising, and low water at the setting, of the moon.

This theory of tides has been extended so far, as to estimate the tides, or elevations of the waters of the moon, produced by the attraction of the earth: thus, let us suppose the quantity of matter (Q) in the earth to be to that in the moon (q) as 40 to 1, that is, $Q:q::40:1$; and let us first suppose the earth and moon of equal bulk, and represented by AIK (*ibid.* fig. 6.) and BDE, and the force (F) of the earth, at the surface of the moon B, will be to the force (f) of the moon at the surface of the earth A, directly as the masses of matter in each (because of the equal distances TB and LA) that is, $F:f::Q:q::40:1$. Again, let LB be to LC as the diameter of the earth to that of the moon, which is as 365 to 100, then will the force at B be to the force at C as LB to LC, which let be as F to f , then $F:f::365:100$, whence $F=\frac{365f}{100}$; and above we have $F=40f$,

therefore $4000f=365f$; and so $f:f::365:4000::1:11$ nearly; that is, the power of the earth to raise the water at the moon C, is to that of the moon at the earth A as 11 to 1, very nearly.

If the moon can raise the water here 10 feet, the earth can raise the water there to the height of 110 feet; but because the moon always turns about her axis in the same time as she revolves about the earth, the waters (if any there be) will be raised on this and the opposite side, and always continue over the same part of the moon's surface, so that there can be no different heights of water there, and consequently no tides, except what small ones may happen on account of the sun's attraction, and her various inequa-

lities of motion, and distance from the earth.

The air, which is 860 times lighter than water, must yield in proportion more easily to the attracting force of the sun and moon; and therefore the tides will in this profound and vast aerial ocean be very considerable and importing: but of this the reader may expect a further account under the articles ATMOSPHERE, HEAT, WIND, &c.

TIDE-WAITERS, or TIDESMEN; are inferior officers belonging to the custom-house, whose employment it is to watch or attend upon ships, until the customs be paid: they get this name from their going on board ships, on their arrival in the mouth of the Thames or other port, and so come up with the tide.

TIDOR, one of the Molucca islands, situated in 125° east long. and 1° north lat.

TIERACHE, the most easterly division of Picardy, in France.

TIERCE, or TEIRCE, a measure of liquid things, as wine, oil, &c. containing the third part of a pipe, or forty-two gallons. See the article MEASURE.

TIERCE, in gaming, a sequence of three cards of the same colour. See the articles PICQUET and QUADRILLE.

TIERCED, *tierce*, in heraldry, denotes the shield to be divided by any of the partition-lines, as party, coupy, tranchy, or tailly, into three equal parts of different colours or metals.

TIGE, in architecture, a french term for the shaft or fust of a column, comprehended between the astragal and the capital. See COLUMN and SHAFT.

TIGER, or TYGER, *tigris*, in zoology, an animal belonging to the felis-kind, with an elongated tail, and virgated spots. See the article FELIS.

The tiger is a large and terrible animal, exceeding the lion both in size and fierceness; being at its full-growth of the bigness of a small heifer: its head is large, and the teeth enormously long: the fore-legs are very thick and strong, and the tail is long: the ground colour in the tiger is a pale tawney, with an admixture of brown; but it is all over variegated with streaks of black. See plate CCLXXVII. fig. 3.

The tiger has its name from its supposed swiftness, and has been described by almost all authors as one of the swiftest of all the wild carnivorous animals; but this has been wholly contradicted by such authors as have seen the creature, who all declare

declare that it is a slow and sluggish animal, and is unable to overtake a man, or almost any animal that has an opportunity of running away from it. It will give two or three large leaps; but if it do not seize its prey in these, is but ill qualified to catch it afterwards.

TIGER-SHELL, a beautiful species of voluta, of a dusky red colour, spotted all over, with large irregular blotches of white: it is brought from the East Indies, and is about two inches and an half in length, and about an inch in diameter. See plate CCLXXXV. fig. 1.

TIGRIS, a large river of Turkey in Asia, which, rising in the mountains of Armenia, runs southward, dividing Diarbeck or Mesopotamia, from Curdistan or the antient Assyria; and having passed by Bagdat, joins the Euphrates in Eyraca Arabic, or the antient Chaldea. See the article EUPHRATES.

TILBURY, a fortress in the county of Essex, situated on the river Thames, opposite to Gravesend, twenty miles east of London.

TILE, or **TYLE**, among builders. See the article TYLE.

TILIA, the **LIME-TREE**, in botany, a genus of the polyandria-monogynia class of plants, the corolla of which consists of five oblong and obtuse petals, crenated at the points: the fruit is a coriaceous, globose, quinquelocular capsule, containing a single roundish seed in each. However, one seed only of the five usually ripens, and the very cells of the others often disappear, so that the fruit seems unilocular. See plate CCLXXVII. fig. 4. The flowers of the lime tree are esteemed antepileptic, and a specific in all kinds of spasms and pains: they are used in infusion, like tea.

The timber of the lime-tree is used by the carvers, as being a soft light wood; also by architects, for framing the models of their buildings: the turners likewise use it for making light bowls, dishes, &c. but it is too soft for any strong purposes.

TILLÆA, in botany, a genus of the triandria trigynia class of plants, the flower of which consists of three ovated, acute, and plane petals; and its fruit of three acuminate and reflex capsules, containing each two oval seeds.

TILLANDSIA, in botany, a genus of the hexandria-monogynia class of plants, with a tubulated monopetalous flower, trifid at the limb: the fruit is a long,

obtusely trigonal, and acuminate capsule, formed of three valves, and containing only one cell, with numerous seeds affixed to a long capillary plume.

TILLER, in husbandry, denotes a young tree, left to grow till it be felleable for timber.

TILLER of a ship, a strong piece of wood fastened in the head of the rudder, and in small ships and boats called the helm. See the article HELM.

In ships of war, and other large vessels, the tiller is fastened to the rudder in the gun room: and to the other end there are ropes fastened, which pass upwards to the quarter-deck, where the ship is steered by means of a wheel. See the article STEERING.

TILLAGE, in husbandry, is the opening, breaking, and dividing the ground by the spade, the plough, the hoe, or other like instruments. See the articles PLOWING, HOEING, &c.

The finer any land is made by tillage, the richer it will become, and the more plants it will maintain; and it has been frequently observed, that in a large field, where at some time one part of the ground has been better tilled than the rest, that part of the ground has produced the best crops, and been easily distinguished by it from the rest of the field, even six or seven crops after the time of the particular good tillage. A piece of ground being once made finer than the rest, will a long time shew the advantage of it; because the dews have more power to enrich it, they penetrating farther than the superficies, whereby the roots are able to enter. The fine parts of the earth are impregnated throughout their whole substance with some of the riches carried in by the dews, and there repositied until, by tillage, the inside of those fine parts become superficies; and as the corn drains them, they are again supplied as before; but the rough large parts cannot have that benefit, and the dews not penetrating but to their surface, they remain poor. The experiments mentioned by Mr. Evelyn prove this beyond contest. Take of the most barren earth you can find, powder it well, and expose it abroad for a year, incessantly agitating it; and after this, without any other management, this earth will be the most fertile that can be conceived, and will readily receive any plant from the farthest Indies: all vegetables will prosper and flourish in this once barren earth, and bear

bear their fruit as kindly with us, under a due degree of artificial heat, as in their native climates.

The artificial dust will entertain plants which refuse dung and other violent applications, and has a more nutritive power than any artificial dung or compost whatsoever: and by this pulverising and exposing, the very nature of a soil may be changed, and the toughest clay made as light and friable as common light earth, and as fit for the nourishment of the tenderest plants as any other; though, in its natural condition, its pores were too small to give way to their tender roots, and had no communication one with another.

This is a sort of improvement of land that cannot be practised in the large way, in fields, &c. but as it only consists in dividing and breaking the particles of earth, and exposing them thus broken to the air, it is plain that common tillage approaches more or less to it, as more or less labour is employed; and the experiment proves, that the farmer need never fear bestowing too much tillage on any sort of ground.

TILT-BOAT, a boat covered with a tilt; that is, a cloth or tarpawling, sustained by hoops, for the sheltering of passengers.

TIMAR, a tract or portion of land, which the grand seignior grants to a person on condition of serving him in war on horseback. Hence, those who enjoy such lands, are called timariots; who besides the above-mentioned service, pay an acknowledgment of one tenth of their revenue.

TIMBER, includes all kinds of felled and seasoned woods. See **WOOD**.

Of all the different kinds known in Europe, oak is the best for building, and even when it lies exposed to air and water, there is none equal to it. Fir-timber is the next in degree of goodness for building, especially in this country, where they build upon leases. It differs from oak in this, that it requires not much seasoning, and therefore no great stock is required before-hand. Fir is used for flooring, wainscoting, and the ornamental parts of building within doors. Elm is the next in use, especially in England and France; it is very tough and pliable, and therefore easily worked; it does not readily split; and it bears driving of bolts and nails better than any other wood; for which reason it is chiefly

used by wheel-wrights, and coach-makers for shafts, naves, &c. Beech is also used for many purposes; it is very tough and white when young, and of great strength, but liable to warp very much when exposed to the weather, and to be worm-eaten when used within doors; its greatest use is for planks, bedsteads, chairs, and other household goods. Ash is likewise a very useful wood, but very scarce in most parts of Europe; it serves in buildings, or for any other use, when screened from the weather; handspikes, and oars are chiefly made of it. Wild chestnut-timber is by many esteemed to be as good as oak, and seems to have been much used in old buildings; but whether these trees are more scarce at present than formerly, or have been found not to answer so well as was imagined, it is certain this timber is now but little used. Walnut-tree is excellent for the joiner's use, it being of a more curious brown colour than beech, and not so subject to the worms. The poplar, alder, and aspen trees, which are very little different from each other, are much used instead of fir, they look well, and are tougher and harder. See **OAK**, **FIR**, **ASH**, &c.

The goodness of timber not only depends on the soil and situation in which it stands, but likewise on the season wherein it is felled. In this, people disagree very much; some are for having it felled as soon as its fruit is ripe, others in the spring, and many in the autumn. But as the sap and moisture of timber is certainly the cause that it perishes much sooner than it otherwise would do, it seems evident that timber should be felled when there is the least sap in it, viz. from the time that the leaves begin to fall, till the trees begin to bud. This work usually commences about the end of April in England, because the bark then rises most freely; for where a quantity of timber is to be felled, the statute requires it to be done then, for the advantage of tanning; see **TANNING**.

The ancients chiefly regarded the age of the moon in felling their timber; their rule was to fell it in the wain, or four days after the new moon, or sometimes in the last quarter. Pliny advises it to be in the very article of the change, which happening to be in the last day of the winter solstice, the timber, says he, will be incorruptible. Timber should likewise be cut when of a proper age; for when it is either too young, or too old, it

it will not be so durable, as when cut at a proper age. It is said, that oak should not be cut under sixty years old, nor above two hundred. Timber however, should be cut in their prime, when almost fully grown, and before they begin to decay; and this will be sooner or later, according to the dryness or moistness of the soil, where the timber grows; as also according to the bigness of the trees; for there is no fixt rules in felling of timber, experience and judgment must direct here as in most other cases.

After timber has been felled and sawed, it must be seasoned: for which purpose some advise it to be laid up in a very dry airy place, yet out of the wind and sun, or at least free from the extremities of either; and that it may not decay, but dry evenly, they recommend it to be daubed over with cow-dung. It must not stand upright, but lie all along, one piece over another, only kept apart by short blocks interposed, to prevent a certain mouldiness, which they are otherwise apt to contract in sweating on one another; from which arises frequently a kind of fungus, especially if there be any sappy parts remaining. Others advise, the planks of timber to be laid for a few days in some pool or running stream, in order to extract the sap, and afterwards to dry them in the sun or air. By this means, it is said, they will be prevented, from either chopping, casting, or cleaving, but against shrinking there is no remedy. Some again, are for burying them in the earth, others in a heat; and some for scorching and seasoning them in fire, especially piles, posts, &c. which are to stand in water or earth. The Venetians first found out the method of seasoning by fire; which is done after this manner; they put the piece to be seasoned into a strong and violent flame, in this they continually turn it round by means of an engine, and take it out when it is every where covered with a black coaly crust; the internal part of the wood is thereby so hardened, that neither earth nor water can damage it for a long time afterwards.

After the planks of timber have been well seasoned and fixed in their places, care is to be taken to defend or preserve them; to which the smearing them with linseed oil, tar, or the like oleaginous matter, contributes much. The antients, particularly Hesiod and Virgil, advise the

smoak-drying of all instruments made of wood, by hanging them up in the chimneys where wood fires are used. The Dutch preserve their gates, port-cullices, drawbridges, sluices, &c. by coating them over with a mixture of pitch and tar, whereon they strew small pieces of cockle and other shells, beaten almost to powder, and mixed with sea sand, which incrusts and arms them wonderfully against all assaults of wind and weather. When timber is felled before the sap is perfectly at rest, it is very subject to the worms; but to prevent and cure this, Mr. Evelyn recommends the following remedy, as the most approved. Put common sulphur into a cucurbit, with as much aqua fortis as will cover it three fingers deep; distill it to a driness, which is performed by two or three rectifications. Lay the sulphur that remains at bottom, being of a blackish, or sad red colour, on a marble, or put it in a glass, and it will dissolve into an oil; with this oil anoint the timber which is infected with worms. This, he says, will not only prevent worms, but preserve all kinds of woods, and many other things, as ropes, nets, and masts, from putrefaction, either in water, air, or snow.

To measure round timber, let the mean circumference be found in feet and decimals of a foot; square it, multiply this square by the decimal 0.079577, and the product by the length. Ex. Let the mean circumference of a tree be 10.3 feet, and the length 24 feet. Then $10.3 \times 10.3 \times 0.079577 \times 24 = 202.615$, the number of cubical feet in the tree. The foundation of this rule is, that when the circumference of a circle is 1, the area is 0.0795774715, and that the areas of circles are as the squares of their circumferences.

But the common way used by artificers for measuring round timber, differs much from this rule. They call one fourth part of the circumference the girt, which is by them reckoned the side of a square, whose area is equal to the area of the section of the tree; therefore they square the girt, and then multiply by the length of the tree. According to their method, the tree of the last example would be computed at 159.13 cubical feet only.

For the method of measuring round timber by the sliding rule, see RULE.

For measuring hewn or square timber, the custom is, to find the middle of the length



length of the tree, and there to measure its breadth, by clapping two rules to the sides of the tree, and measuring the distance betwixt them; in like manner they measure the breadth the other way. If the two be found unequal they are added together, and half their sum is taken for the true side of the square.

As to the strength of timber, Mr. Parent is the first who has treated this subject in a scientific manner, and in order to enforce his demonstrations, he made several experiments, with various scantlings of oak and fir. Mr. Muller, in his treatise on fortification, gives the following problem, to determine the strength of a scantling, whose dimensions are given. He supposes that all the fibres of the wood are straight, and of the same strength, even in its weakest part, and that the fibres are the same in the same sort of wood; and although this may not be strictly true, yet it is sufficiently near enough in practice so as to cause no sensible error. Suppose the scantling $A B C$ (plate CCLXXIX. fig. 1. n° 1.) to be supported in the middle D , by the edge of a triangular block R , and two equal bodies, P , Q , to be suspended at A and C , equally distant from the middle B , of such a weight as to break the scantling. It is evident, that the weights P and Q will cause the scantling to bend at first, so as to make a kind of curvilinear angle at B , and then to break in that place, in a section $B D$, perpendicular to either of the sides $A C$; now as the power or force of these weights is more or less, according as they are suspended farther from, or nearer to the fixed point D ; these forces will therefore be in proportion to the products of the weights of each multiplied by its respective distance from the section $B D$; or because the weights and distances are here supposed equal, twice the product of one of the weights P , multiplied by its distance, from the section $B D$, and will express the force of these two weights. The force of the weights being thus determined, the resistance or strength of the wood is next to be found, which is done in the following manner. Let $ac b$ (*ib.* n° 2.) represent the section of the scantling; it is evident that this area represents the sum of all the fibres to be torn or broken; and as they are all supposed equal, and of the same strength, this area will express the

sum of the strength of all the fibres: but as the point D , or the base ab of the section is fixed; and the directions of the fibres perpendicular to the area $ac b$, the force or resistance of each fibre is equal to the product of its strength, multiplied by its distance from the base ab ; and therefore the sum of all the fibres placed in the same line df , parallel to the base ab , multiplied by their distance ad , from that base ab , will express their momentum or resistance. What has been proved in regard to all the fibres placed in the line df , is equally true of all those placed in any other line parallel to the base ab : and therefore the sum of all these products will express the total strength or resistance of the wood: but by the nature of the center of gravity, the product of the area $ac b$, multiplied by the distance of its center of gravity from the base ab , will express the total strength or resistance of all the fibres, or that of the whole scantling; consequently, having the strength of any scantling of the same wood determined by experiment, that of any other may be found.

If the scantling $A C$ (*ibid.* n° 3.) be supported at both ends by the triangular blocks $P Q$, and the weight W , hanging in the middle B : then if we suppose the weight P and Q in the first figure, to represent the blocks P and Q in this; then as each block supports half the weight W ; it is evident, that the weight W , multiplied by the distance AB or BC , will express its momentum or force. Moreover, since the weight W is suspended in the middle betwixt the fixed points, it is evident that each block supports exactly half the weight; and as the power or force of this weight on the blocks P, Q , is as the product of half the weight multiplied by the distance AB or BC of its direction from the fixed point, it follows, that the whole force of this weight is as twice the product of half the weight W , multiplied by AB or BC ; or as the whole weight W multiplied by the distance AB or BC .

Hence also, if the length AC of the scantling between the fixed points A, C , be c ; the area of the section s ; the distance of its center of gravity from the base d , and the weight W , w ; then will $\frac{1}{2} c w$ express the force of the weight W , and ds the strength of the scantling: therefore the momentum of the weight

weight is to the momentum of the scantling is $\frac{1}{2} c w$ is to ds ; or as w is to $\frac{2 ds}{c}$, and if this ratio be given $w = \frac{2 ds}{c}$.

From whence may be drawn several useful consequences. 1. The strengths of two scantlings of the same wood, and of different dimensions; or, which is the same, the weights they will bear, are to each other as the products of their sections multiplied by the distances of the centers of gravity from the base, divided by their lengths. 2. The strengths of two scantlings of the same wood, which have the same length, are as the products of their sections multiplied by the distances of their centers of gravity from the base. 3. The strengths of two scantlings of the same wood, which have equal sections, are as the distances of their centers of gravity divided by their lengths. 4. The strength of scantlings of the same wood, whose distances of their centers of gravity of their sections, from the base, are equal, will be to each other as their sections divided by their lengths.

Again, if the section of the scantling AC be a rectangle placed flat on one of its sides, which we call b , and its height or other side a ; then will ab express the area of the section; and the distance d of its center of gravity from the upper base, will be $\frac{1}{2} a$, therefore the equation already found $w = \frac{2 ds}{c}$ becomes here $w = \frac{a ab}{c}$ which shews

that the strength of a rectangular scantling laying flat on one of its sides, is as the product of the square of its height multiplied by its base, and divided by its length. Hence, a deal board of an inch thick, and ten inches broad, being placed on its flat side, and then on its narrow side; the force in the first case will be to the force in the second, as 1 is to 10. For the force in the first case, will be as 10 multiplied by the square of unity; and in the second, as unity multiplied by the square of 10, that is, as 10 is to 100, or as unity is to 10. So that if it bears 50 pounds when it lies flat, it will bear 500 when it lies on the narrow side.

TIMBRE, or TIMMER, in heraldry, denotes the crest of an armory, or whatever is placed at top of the escutcheon, to distinguish

the degree of nobility; either ecclesiastical or secular.

TIME, *tempus*, a succession of phenomena in the universe; or a mode of duration, marked by certain periods or measures, chiefly by the motion and revolution of the sun.

The idea of time, in the general, Mr Locke observes, we acquire by considering any part of infinite duration as set out by periodical measures: the idea of any particular time, or length of duration, as a day, an hour, &c. we acquire first, by observing certain appearances a regular, and, seemingly, at equidistant periods.

Now, by being able to repeat those lengths or measures of time, as often as we will, we can imagine duration, where nothing really endures or exists; and thus we imagine to-morrow, next year, &c. Some of the latter school-philosophers define time to be the duration of a thing, whose existence is neither without beginning nor end: by which time is distinguished from eternity.

Time is distinguished into absolute and relative. Absolute time, is time considered in itself, and without any relation to bodies, or their motions. This flows equally, *i. e.* never proceeds faster or slower, but glides on in a constant, equable tenor. Relative time, is the sensible measure of any duration by means of motion. For since that equable flux of time does not affect our senses, nor is any way immediately cognizable thereby, there is a necessity for calling in the help of some nearly equable motion to a sensible measure, whereby we may determine its quantity, by the correspondence of the parts of this with those of that.

Hence, as we judge those times to be equal which pass, while a moving body, proceeding with an equable velocity, passes over equal spaces; so we judge those times to be equal which flow while the sun, moon, and other luminaries, perform their revolutions, which, to our senses, are equal.



But since the flux of time cannot be accelerated, nor retarded, whereas all bodies move sometimes faster and sometimes slower, and there is, perhaps, no perfectly equable motion in all nature, it appears hence to follow, that absolute time should be something truly and really

really distinct from motion. For let us suppose the heavens and stars to have remained without motion from the very creation, does it hence follow, that the course of time would have been at a stand? Or, rather, would not the duration of that quiescent state have been equal to the very time now elapsed?

Astronomical TIME, is that taken purely from the motion of the heavenly bodies without any other regard.

Civil TIME, is the former time accommodated to civil uses, and formed and distinguished into years, months, days, &c.

TIME, in music, is an affection of sound, whereby we denominate it long or short, with regard to its continuance in the same degree of time. See the article **SOUND**. Common, or duple time, is of two species. 1. When every bar or measure is equal to a semi-breve, or its value, in any combination of notes of a lesser quantity. 2. When every bar is equal to a minim, or its value, in lesser notes. The movements of this kind of measure are various, but there are three common distinctions; the first slow, signified by the mark C; the second brisk, signified by

; the third very quick, signified by .

For triple time, see the article **TRIPLE**.

TIME, in fencing. There are three kinds of time; that of the sword, that of the foot, and that of the whole body. All the times that are perceived out of their measure, are only to be considered as appeals, or feints, to deceive and amuse the enemy. See the article **FENCING**.

TIMOR, an island in the Indian-ocean, situated between 122° and 126° of east long. and between 8° and 10° south lat. It is in the possession of the Dutch, and said to have gold mines.

TIN, *stannum*, \mathcal{T} , a well-known whitish metal, softer than silver, yet much harder than lead. See the article **METAL**.

Tin is the lightest of all the metals: it is remarkable for a quality that no other of them has, which is, that when bent it makes a crackling noise. It is harder than lead, but less so than any other of the metals: it is malleable in a very remarkable degree, though less so than lead: it may be easily drawn into a coarse wire, but if this be attempted to be brought to any degree of fineness, it snaps and breaks under the workman's hands.

Tin is less susceptible of rust than most of

the other metals: it is very little elastic, and scarce at all sonorous. It melts with a much smaller degree of fire than any other metal, a heat but a little greater than boiling-water being sufficient to fuse it. It melts before it grows red-hot, like lead: and a degree of heat so much less even than that requisite to the running of lead, is necessary to the fusing of this metal, that it may be easily separated from the other by eliquation; and if the fire be kept under a mixed mass of the two, so low as to be just hot enough to melt the lead, the tin will all run off from it.

Tin amalgamates very readily with mercury, and may be mixed in fusion with most other metals, and as readily separated from them again by the before-mentioned process of eliquation. It is the least simple of all the metals, being brought, by a very small degree of fire, to emit sulphureous fumes: these are plainly the absolute sulphur of the metal. They do great injury to the people employed to work upon it, rendering them pale, and often absolutely destroy them. The consequence of the emitting these fumes so abundantly is, that tin, of all metals, loses most of its weight, and calcines most easily in the fire. Exposed to the focus of a great burning-glass, it immediately melts, and sends off a large quantity of thick, white fume; the remaining matter is then a fine crystalline or glossy matter, in form of needles; these, if held ever so long in the same heat, undergo no farther change, never running into a mass of glass, as the remains of most of the metals do under the same circumstances; but, like the glasses of the other metals, if exposed again to the same heat, laid on a piece of charcoal, they immediately run into tin again; and the same thing happens if it be continued on the tile or coppel it was first placed on in the focus, and some fat matter, as tallow, or the like, to be added to it. Filings of tin thrown into the flame of a candle, take fire, and render the flame blue, emitting a visible fume, and a smell of garlic: melted in a crucible, with a mixture of nitre, it deflagrates. Its constituent matters, therefore, seem to be a crystalline earth which melts with great difficulty, and an inflammable sulphur; in which, from its smell, while calcining, and from its poisonous quality, it is probable there may be something of arsenic mixed.

For the specific gravity of pure tin, see the article GRAVITY.

Tin so far endures the force of lead and antimony in the refiner's test, that it is hardly to be separated from them, unless by the addition of copper: it adheres to the rest of the metals with greater ease than any other, and hence it is in continual use in covering plates of iron, and lining copper, and other metals, to prevent their rusting, and to save the liquids put into them from taking up any bad qualities from those metals as it is much more difficultly dissolved by common menstrooms than either of them.

Tin, in many things, greatly approaches to the nature of silver. It very readily melts with silver, gold, or copper; when the mixture is made with equal, or even a less quantity, it renders them extremely brittle: but it is very singular, that if it be mixed in a much larger quantity, they still continue pliant and flexible. Ten parts of tin, and one of copper, make a mass more rigid indeed than tin, yet malleable and ductile. Silver, of all metals, suffers most by an admixture of tin, a very small quantity of it serving to make that metal as brittle as glass; and what is worse, being very difficultly separated from it again. The addition of about one tenth part of copper to tin makes it fit for the common uses of life, in vessels of various kinds, as it becomes, by the mixture, more durable; a little zinc, added to this mixture, gives the metal a yellow colour; and, as it is mixed in greater or less quantity, makes it fit for casting of cannon and for bells.

Iron readily mixes with tin, in fusion, if the fire be brisk, and the iron be heated white hot before the tin be added. Twice the quantity of this metal, added to iron so heated, readily runs with it into an odd substance, which is very white and brittle, and readily answers to the magnet. This has been used, by some, as a pretence of its not being iron, and that the loadstone would attract another metal beside that: but the fallacy is easily discovered by any one that understands any thing of metallurgic analysis. Lead bears a considerable admixture of tin, without being affected as gold and silver are, which are both rendered brittle by it; at least, its effects on this metal are in a much smaller degree. The very vapour of tin has the same effect with the metal itself on silver, gold, and

copper, rendering them brittle. Many a metallurgist has been long plagued by these vapours by a piece of tin being accidentally among his charcoal; the consequence of which has been, that, till it was burned wholly away, these metals have been rendered as brittle as glass under the hammer, by only being fused over these coals. It is owing to this property of tin, in making the metals it is mixed with brittle, that it renders them sonorous. Mr. Boyle has expressed a wonder that tin, which is itself not much sonorous, should on mixture with copper render it more so; but if we consider that the same sort of disposition of parts which renders metals rigid and brittle renders them sonorous, the mystery is explained.

The proper solvent of tin, in its true malleable state, is aqua regia. It will not well dissolve in any of the other menstrea of the stronger kinds, nor indeed very readily in this. We are not, however, to wonder at this difficulty of solution in tin, since we find it contains much more sulphur than any other metal, and sulphur is not one of those substances that are to be dissolved by acids. That this is a fact we find by putting calcined tin, instead of common malleable tin, into the menstruum, for in this case even vinegar will dissolve it. While tin is in its malleable state, the weakest acids dissolve it best. Verjuice, and it is said even four apples boiled in tin vessels, acquire a taste of that metal, though the strongest acids, aqua regia excepted, boiled in the same vessels, acquire no flavour from it at all.

Many of the chemical writers have been of opinion, that, if the sulphur could be thoroughly purged from tin, it would be no longer tin, but silver; it is certain that the two metals have many things in common. If dissolved in aqua regia, tin is bitter, as well as silver, in solution with the nitrous acid; but the crystals which are produced from a solution of it in vinegar, after it has been calcined for forty-eight hours together, which is a necessary step towards such a solution, (and which one would think should bring it nearer to silver than before, if the dissipating its sulphur were the way to do it,) differ wholly from those of silver. We have indeed accounts, in many authors, of tin being made to yield a large quantity of silver by peculiar processes; but that careful experimenter,

Mr.

Mr. Boyle, tells us, that all tin is not to be expected to yield those advantages in the same manner, for that himself had separated pure crystals of silver from one parcel of tin by a peculiar menstruum, but that another parcel of the same metal would not answer in the same manner.

Though tin and lead readily unite in fusion over a gentle fire, if the heat be afterwards raised to a violent degree, there is a visible motion excited in the mixture; and the consequence is, that both are reduced to a calx, and the lead becomes extremely difficult afterwards to vitrify.

The effect that zink has upon a mixture of tin and copper, the copper being in a larger proportion than has been usually given in such mixtures, is little known, and seems to be a secret that the people who are possessed of it intend to make use of to themselves.

Tin, when it mixes itself with crystal in the earth, influences both its figure and colour. It gives it a pyramidal form consisting of four sides, short and with a broad base, and at the same time usually communicates a yellow colour with an admixture of a dusky brown, which makes it much inferior to the yellow crystal made so by lead. Even the tin-grains, though very different substances from the crystals we are describing, have something of this yellow colour which appears when they are broke into small pieces, though in the mass they are opaque and blackish. In the making of the artificial gems, there is a method of obtaining this colour from tin, and communicating it to glasses. It seldom succeeds indeed in the common way of doing this by lead: but in vitrifications, where the basis is borax, the calx of tin properly treated with vinegar yields crystals, which will communicate the true colour of the browner topazes to the vitrified mass.

The ores of tin are very various, as it is found blended with all kinds of substances, with marcasitic and stony matter, and even with other metals. The Germans have lately talked of finding native tin in the perpendicular fissures of some of their iron mines; but there seems no foundation for the opinion; for this pretended native tin wants the first of all the characters of a native metal, malleability. It flies to pieces under the hammer, and on trial in the fire proves to be a marcasitic ore, very rich indeed in tin, a very sin-

gular and valuable substance, but not, as pretended, native tin. This remarkable ore is found in nodules from an ounce to three or four in weight; it is of a bright silvery colour, like the white arsenical pyrites, but covered with a coarse dusky crust: when properly worked, it is the richest tin-ore to be met with, five drachms of pure tin having been separated from an ounce of it.

The next ore to this in richness, and that which has consequently been usually accounted the richest of all, is the tin-grain, or lapis jovius. This is an ore of tin, of a fine glossy black colour on the outside, but, in thin pieces held up against the light, it is transparent and yellowish: it is the heaviest of all the metalline ores, and is of a very irregular figure, but in the finest pieces it seems to approach to the shape of those crystals which are found joined base to base, without any intermediate column. In size it is of the bigness of a large walnut down to that of a pin's head; for of that minuteness we meet with some perfect tin-grains.

After the tin-grain we shall mention a black and very heavy tin-ore, of an irregular figure and metalline appearance; but this, though it promises very fairly by its weight, seldom yields so much as half a drachm of metal from the ounce, in its crude state; if washed indeed, and all the foreign matter carried off, it may be reduced almost to the purity of the tin-grains before the working.

The tin-ores of Germany usually contain a very large quantity of iron; ours are free from this admixture, and are greatly the more valued for it. Our other ores of tin, besides the two above described, are a brownish or blackish stony one, very hard and heavy; this is debased by a great quantity of the stony matter, and requires careful washing before it is brought to the fire; and a yellowish or whitish ore; which are less heavy and more brittle than the others, and contain a large quantity of common sulphur; and to these may be added another, in which the metal is yet more mixed with sulphur: this is the mundic found in the tin-mines, which is very bright and shining, of a silver or gold colour, and often contains a large portion of tin, though it is not separated from it without difficulty, because of the abundance of sulphur in the mass. We have also a red ore of tin, of a stony, and

and sometimes of an earthy nature, and carrying so little of the appearance of an ore of this metal, than it is hard to guess what could lead any body to work it in expectation of it. It is however very rich.

Tin-ore is also sometimes found mixed with that of lead, and carrying the external appearance of lead only. Some of these ores are neglected in France, where they might turn to a very considerable account under proper management. The German ores of tin are usually so much like iron, that, at first sight, it is scarce possible to distinguish them. We are also finally to add to the number of tin-ores the dodecahedral garnets sold by our druggists; these are in general irregularly figured, but the most regular of them always consists of twelve sides; they are of a deep red colour, and in size from the bigness of the largest pea to that of a pin's head. These are truly ores of tin, of the nature of the tin-grains, but not so rich. See GARNET, &c.

There is something very singular in the great gravity of tin-ore beyond that of the ores of other metals; but it contains so much arsenic, and is so dangerous to the person who works it, that experiments are not expected to be made very frequently on it. The tin-ores in general are stubborn and refractory in the fire; it is easy, however, to find whether an ore does contain this metal or not; for if a piece of it be powdered and washed, and afterwards sprinkled thinly over an iron-plate made white hot on the fire, the tin-ore, in this case, if there be any in the mass, will be found in little parcels of a red colour covered with grey flowers of an arsenical smell. The various kinds of mundic common in the cornish mines are not only rejected from the works as ores themselves, but they are carefully separated from among the other ores of a better kind, as they are apt to be very troublesome, even in the smallest quantities, in working the rest. They then pound and wash the ore; and when they have thus separated all the lighter impurities, till there is no longer any smell of sulphur or of garlic, they grind it to a tolerably fine powder, and, after washing it again, it is carried to the melting-houses, where it is melted into metal by mixing it with charcoal, and urging the fire to the utmost violence by the blast of large bellows. There is a cavity at the bottom of the furnace into which the metal

runs, as it separates from the ore, and out of which they let it by an aperture closed and opened at pleasure, running it into cakes or pigs, which are the large blocks we see it in.

Tin-ore, in general, contains a great quantity of arsenic, which discovers itself in the roasting in form of a white cloud, and which it is very material to burn quite away, as it otherwise renders the metal brittle. Charcoal alone commonly serves for fluxing the ore of tin, but, if any be found very refractory, a little common black pitch is an excellent addition. See the article FLUX.

The virtues of tin, as a medicine given internally, have been celebrated by many of the antient writers, but it has less credit at present. We have been told that in diseases of the lungs, and in disorders of the head and uterus, there is scarce any thing equal to it; and that in convulsions, epilepsies, and the madness arising from the bite of a mad dog, it was a certain remedy. These last are the only cases in which it has any degree of credit at present, and that is rather among the vulgar than among physicians. In the manufactures it is of great use in folders, and when amalgamated with mercury, and a little bismuth added to make it run thin, it serves in the silvering of looking-glasses. By calcination it makes a soft powder called putty, of great use in polishing glass and gems, and also in making enamels.

The preparations of tin are, 1. Powdered tin, made by pouring melted tin into a wooden box, the inside of which is chalked all over, and briskly shaking it till cold, when a part of it will be found reduced to powder, which is said to be good for worms, but we have no certain accounts of its good effects. 2. Salt of tin, obtained by pouring distilled vinegar upon calcined tin, heating the solution till it near boils, and afterwards evaporating it to a pellicle, and setting it in a cool place; then there will shoot very pellucid and hard crystals, which are recommended in hysteric cases, to be given from two to four or five grains at a dose. 3. The antiseptic of Poterius. 4. The aurum musivum. See the articles ANTIHETICS and AURUM.

To these preparations used in medicine, we may add one well known as a cosmetic: it is a magistery of tin prepared in the manner of that of bismuth, by first mixing six ounces of spirit of nitre with

with one ounce of spirit of sea-salt, and then putting tin into this liquor, or aqua regia, till it is capable of holding no more: lastly, pour the solution into six or eight quarts of spring-water, and the tin will be precipitated in form of a white powder, which should be washed several times, and then dried for the use of the ladies in pomatums, to render the skin white and soft.

TINA, a town of european Turkey, on the confines of Dalmatia, situated in east long. 18°, north lat. 44° 6'.

TINCA, the **TENCH**, in ichthyology. See the article **TENCH**.

TINCTURE, *tinctura*, in pharmacy and chemistry, a separation of the finer and more volatile parts of a mixed body, made by means of a proper menstruum dissolving and retaining the same. See **MENSTRUUM** and **SOLUTION**.

Rectified spirit of wine dissolves the volatile oils and resins of vegetables, whilst water acts more immediately on their mucilaginous and saline matter. Hence, in whatever proportion the soluble parts of any vegetable are blended together, a spirit may be so adjusted thereto by art, as entirely to dissolve the whole, and consequently to extract all the virtues of the subject, without any of the useless or woody parts. Fixed alkaline salts deepen the colour of spirituous tinctures, but add nothing to the dissolving power of the menstruum: nor is the addition of these salts useless only, but likewise prejudicial, as they injure the flavour of aromatics, and superadd a quality sometimes contrary to the intention of the medicine. Volatile alkaline salts, in many cases, promote the action of the spirit; but acids, almost universally, weaken it. See **ALKALI** and **ACID**.

As to the method of extracting tinctures, the following general rules may be of use in this respect. 1. The vegetable substances ought to be moderately and newly dried, unless they are expressly ordered otherwise; they should likewise be cut and bruised before the menstruum is poured on them. 2. If the digestion is performed in balneo, the whole success depends upon a proper management of the fire: it ought to be all along gentle, unless the hard texture of the subject should require it to be augmented; in which case the heat may be so increased as to make the menstruum boil a little towards the end of the process. 3. Very large circulatory vessels ought to be em-

ployed for this purpose, which should be heated before they are luted together. A commodious circulatory may be composed of two long-necked matrasses or bolt-heads; the mouth of one of which is to be inserted into that of the other, and the juncture secured by a piece of wet bladder. The use of heating the vessels is, to expel a part of the air; which otherwise, rarifying in the process, would endanger bursting them, or blowing off the uppermost matrass. 4. The vessel is to be frequently shaken during the digestion. 5 All tinctures should be suffered to settle before they are committed either to the filter or strainer. 6. In the tinctures, and distilled spirits likewise, designed for internal use, no other spirit, drawn from malt, melasses, or other fermented matter, is to be used, than that expressly described.

Of tinctures there are various sorts, and for various uses; cephalic tinctures, antiscorbutic tinctures, stomachic tinctures, anticolic tinctures, and invigorating tinctures; there are tinctures drawn from roses, from cinnamon, and an infinite number of other substances, which it would be too tedious to mention.

TINCTURE, in heraldry, the hue or colour of any thing in coat armour, under which denomination may also be included the two metals, or and argent, because they are often represented by yellow and white. See **COLOUR** and **METAL**.

TINE. There are two rivers of this name, the one called North-Tine, which rises on the borders of Scotland; and the other South-Tine, which rises on the confines of Cumberland; the one running south-east, and the other north-east; they unite their waters at Hexham, and continuing to run east, divide the counties of Durham and Northumberland, passing by Newcastle, and falling into the German-sea at Tinmouth.

TINEA, in medicine, a disease, the same with the achor or crusta lactea. See **ACHOR**, **CRUSTA**, and **LACTEA**.

TIN-GLASS, a name given by some to a mineral matter more commonly called bismuth. See the article **BISMUTH**.

TINGING of marble. The art of doing this has, in several peoples hands, been a very lucrative secret, though there is scarce any thing in it that has not at one time or other been published. Kircher has the honour of being one of the first, who published any thing practicable about it. This author meeting with stones in some

some cabinets supposed to be natural, but having figures too nice and particular, to be supposed of nature's making, and these not only on the surface, but sunk through the whole body of the stones, was at the pains of finding out the artist, who did the business; and on his refusing to part with the secret on any terms, this author, with Albert Gunter, a Saxon, endeavoured to find it out; in which they succeeded at length very well. The method is this: Take aqua fortis and aqua regia of each two ounces, sal armoniac one ounce, spirit of wine two drams, about twenty-six grains of gold, and two drams of pure silver; let the silver be calcined and put into a vial, and pour upon it the aqua fortis; let this stand some time, then evaporate it, and the remainder will first appear of a blue and afterwards of a black colour. Then put the gold into another vial, pour the aqua regia upon it, and when it is dissolved, evaporate it as the former. Then put the spirit of wine upon the sal armoniac, and let it be evaporated in the same manner. All the remainders, and many others made in the same manner from other metals, dissolved in their proper acid menstrua, are to be kept separate, and used with a pencil on the marble. These will penetrate without the least assistance of heat, and the figure being traced with a pencil on the marble, the several parts are to be touched over with the proper colours, and this renewed daily till the colours have penetrated to the desired depth into the stone. After this, the mass may be cut into thin plates, and every one of them will have the figure exactly represented on both surfaces, the colours never spreading. The nicest method of applying these, or the other tinging substances, to marble, that is to be wrought into any ornamental works, and where the back is not exposed to view, is to apply the colours behind, and renew them so often till the figure is sufficiently seen through the surface on the front, though it does not quite extend to it. This is the method that, of all others, brings the stone to a nearer resemblance of natural veins of this kind.

TINMOUTH, a port-town of Northumberland, situated on the German-sea, at the mouth of the river Tine, seven miles east of Newcastle.

TINNING, the covering or lining any thing with melted tin, or with tin re-

duced to a very fine leaf. Looking glasses are foliated, or tinned, with thin plates of beaten tin, the whole bigness of the glass, applied or fastened thereto by means of quicksilver. See the article **FOLIATING**.

The plumbers, on some occasions, tin or whiten their sheets of lead, in order to which they have a tinning-furnace filled with live coal, at the sides whereof two men are placed, who hold up the sheets over the fire to heat; and the tin leaves being laid over them as fast as the sheets grow hot, and the tin melts, they spread it, and make it take by rubbing it with tow and rosin.

TINNITUS AURIUM, a noise or buzzing in the ear, when it receives sounds which do not exist, or at least which are not produced by the motion of the external air; and the ear being filled with a certain species of sound, cannot admit other sounds, unless they are very violent. The tinnitus is of two kinds, the one proceeding from a distemperature of the organ of hearing, the other from a disorder of the brain.

The cure, according to Heister, is to be performed by temperate diaphoretic powders, and resolving essences, commonly called anticatarrhals; as of amber, the woods, rosemary, together with diaphoretics and alexipharmics, taken often in a day, with tea of betony, with rosemary-flowers, sage, or lavender, or saffaras. In the morning, and at noon the essences are to be taken, and at night the powders. Essence of amber may be applied outwardly, either alone or with a few drops of oil of amber, or one or two drops of oil of camomile put into the ear with cotton, morning and evening; or a grain or two of amber and musk, or castor, in cotton, either alone or with peruvian-balsam; or carminative oils, such as anise, fennel, carraways, or camomile; not neglecting pediluvia, and frequent rubbing of the feet and head. Many have also been cured by the vapour of a decoction of lavender flowers, or rosemary, made with wine being conveyed to the ear with a funnel. If the disease is obstinate and inveterate the patient must bleed in the foot, together with scarifications, and frequent purges, for the sake of revulsion. Et muller says, this noise, proceeding from burning fevers, will go away of itself, but if it proceeds from chronic disorders it is difficult of cure. However, he re-

commends vapours of southern-wood, wormwood, origanum, eyebright, balm, &c. as also of amber, or gum ammoniac; likewise oil of peach kernels, and spirit of urine, put into the ear with cotton.

The following formula is greatly praised. White hellebore and caltor, take of each two drachms; of costmary, one drachm and a half; of rue, two drachms; euphorbium, half a drachm; of bitter-almonds, two drachms and a half; let them be boiled in the oil of rue, and poured warm into the ear. Shaw recommends half an ounce of oil of bitter-almonds, with two drachms of oil of caltor, externally applied.

TINNUNCULUS, in ornithology, the same with kestrel. See **KESTRIL**.

TINO, an island in the Archipelago, situated in east longit. 26°, north lat. 37° 15'.

TINUS LAURISTINE, in botany, a genus of the pentandria-trigynia class of plants, the corolla whereof consists of a campanulated, semiquinifid, obtuse petal, with subcordated laciniae: the fruit is a roundish unilocular berry, umbilicated, with a close calyx: the seed is single and globose. Some botanists make this genus a species of viburnum. See the article **VIBURNUM**.

TIPPERARY, a county of Ireland, in the province of Munster, lying between King's county on the north, and Waterford on the south.

TIPRA, a country of Asia, situated between India and China.

TIPSTAFF, an officer who attends the judges with a kind of staff tipped with silver, and takes into his charge all prisoners who are committed or turned over at a judge's chambers.

TIRE, or **TEER** of guns, in the sea-language, is a row of cannon placed along a ship's side, either above, upon deck, or below, distinguished by the epithets of upper and lower tires.

TIRLEMONT, a town of Brabant, twelve miles south-east of Louvain, and twenty-one north of Namur.

TIROL, a country of Germany, in the circle of Austria, about one hundred and twenty miles long, and sixty broad, subject to the house of Austria: it is bounded by Swabia and Bavaria on the north.

TITANS, in the heathen mythology, the offspring of Titan, the elder brother of Saturn, upon whom, and his son Jupiter,

they made war, in order to recover the sovereignty of which Titan had been deprived. The poets represent them as a race of giants, sprung from the earth, and invading heaven; and tell us, that Jupiter overcame them with thunder, and drove them down to the very bottom of hell.

TITHES, *decima*, in law, denote the tenth part of the increase that annually arises from the profits of lands, and the industry of the parishioners, which is payable for the maintenance of the parson of the parish.

Tithes, it is observed, are of three kinds, predial, personal, and mixed. Predial-tithes are such as immediately arise from the land, whether it be by manuring or its own nature; as corn, grain, hay, wood, fruit, and herbs, which are said to be due without deducting the costs. Personal-tithes are those which only arise from a person's labour and industry, they being a tenth part of his gains in trade, &c. after charges deducted; but this is seldom paid in England, and when it is, it is always due by custom, and payable where the party dwells, hears divine service, &c. Mixed-tithes are such as arise not directly from the ground, but from cattle and other things that receive their nourishment from and are maintained thereout; as calves, colts, pigs, wool, lambs, milk, &c. Tithes are further divided into great and small; great, are corn, hay, and wood; small comprehend all other predial tithes besides corn, &c. as likewise such tithes as are personal and mixed: the great tithes generally belong to the rector, and the small to the vicar.

It has been held, that where land is barren, and not manurable, without extraordinary charge, such land being converted into tillage, shall, for the first seven years after the improvement, be free from paying tithes; but during that space of time it shall pay small tithes, as have been usually paid before, and afterwards the full tithe, according as it is improved: nevertheless, if land is suffered to be over-run with bushes, or become unprofitable through want of husbandry, in that case it cannot properly be called barren; and if the same be grubbed up, or ploughed and sowed, it immediately pays tithes.

As to corn it is tithed by the tenth cock, or sheaf, which if the owner does not set out, he is liable to an action upon the

statute; likewise where a parishioner will not sow the land, the parson may bring his action against him. On the other hand, when the tithes are set forth, if the parson do not carry them away in a reasonable time, but lets the same be too long on the ground, to the prejudice thereof, he may be also subject to an action.

The treble damages, granted by statute, are recoverable in the temporal courts by action of debt, those damages not being limited where to be recovered; and it is the opinion of some, that the double value, or damages, above-mentioned may be recovered in the spiritual court, for this reason, that the person grieved may sue in the ecclesiastical-court for the tithes themselves, or a recompence in lieu of the same, and may also at the same time have the double value. Small tithes that are under the value of forty shillings, a parson may recover before two justices of peace, who are no way interested in the tithes, within twenty days after demand, and two years after due: and the justices may, by distress, levy the money by them adjudged, upon the party's refusal to pay it, ten days after notice, &c. The justices may likewise award costs not above ten shillings, but with liberty to appeal to the quarter-sessions, whose judgment shall be final, unless the title to such tithes shall come in question, &c.

Where a quaker refuses either to pay or compound for great or small tithes, the two next justices of the peace may, on complaint thereof made, summon such quaker before them, and after examining the matter of complaint on oath, may, by order under their hands and seals, direct the payment in all cases under ten pounds. And if, after such order made, the quaker refuses to comply therewith, any one of the justices may by warrant order the same to be levied by distress, &c. See 7 and 8 Wil. III. c. 34. which, by 1 Geo. I. c. 6. is made perpetual.

Notwithstanding these acts, tithes, if of any considerable value, are generally sued for in the exchequer by english bill, except where the suit is founded on the statute of 2 and 3 Ed. VI. for double or treble value, &c.

TITHING, in old law-books, the same with decennary. See DECENNARY.

TITLE, *titulus*, an appellation of dignity, or quality, given to princes, and other persons of distinction. Thus, the title

of his Britannic majesty, is king of Great Britain, France, and Ireland; that of the French king, is king of France and Navarre: and so of others. The pope assumes the title of holiness, and the cardinals that of eminence, &c. See the articles KING, PRINCE, DUKE, POPE, CARDINAL, &c.

TITLE, in law, denotes any right which a person has to the possession of a thing; or an authentic instrument, whereby he can prove his right. See the articles RIGHT, PROPERTY, &c.

As to the titles of the clergy, they denote certain places wherein they may exercise their functions. There are several reasons why a church is called *titulus*; but that which seems to be the best, is because antiently the name of the saint to whom the church was dedicated, was engraved on the porch, as a sign that the saint had a title to that church; and from thence the church itself was afterwards called *titulus*. In this sense a title signifies the church to which a clergyman was admitted, and where he is constantly to reside: and by the canons none shall be ordained without a title. This is in order to keep out such from the ministry who, for want of maintenance, might bring a disgrace upon the church: can. 31. In short, according to some writers, such a title is an assurance of being preferred to an ecclesiastical benefice; that is to say, a certificate that the clerk is provided of some church or place, or where the bishop that ordains him, intends shortly to admit him to a benefice or curacy then void.

TITMOUSE, *parus*, in ornithology, a genus of birds, of the order of the passerines, the beak of which is of a subulated form, and the point of the tongue truncated.

Of this genus there are many elegant species, among which the crested and blue titmouse are not the least beautiful. See plate CCLXXXV. fig. 6. where n^o 1. represents the former, and n^o 2. the latter.

TITUBATION, or **TREPIDATION**, a kind of libration, or shaking, which the antient astronomers attributed to the crystalline heavens, in order to account for certain irregularities which they observed in the motions of the planets. See PLANET and LIBRATION.

TITUL, a town of Hungary, situated on the river Teisse, thirty miles north of Belgrade.

TITU.

TITULAR, denotes a person invested with a title, in virtue of which he holds an office or benefice, whether he perform the functions thereof or not.

The appellation of titular is frequently also given to a person who has the title and right of an office or benefice, but without having possession, or discharging the functions thereof.

TIVERTON, a borough of Devonshire, situated on the river Ex, thirteen miles north of Exeter.

It sends two members to parliament.

TIVIOT, or **CHIVIOT-MOUNTAINS**, are high hills on the borders of England and Scotland.

TIVOLI, or **TIBUR**, a town of Italy, situated on the river Tiverno, twenty miles east of Rome.

TLASCALA, a Town of Mexico, and capital of a province of the same name, about forty-five miles east of the city of Mexico.

TMSIS, *τμσις*, in grammar, a figure whereby a compound word is separated into two parts, and one or more words placed between them : thus, for *quæcunque*, Virgil says, *quæ me cunque vocant terra, &c.*

TOAD, *rubeta*, in zoology, belongs to the same genus with the common frog. See the article **FROG**.

The toad is larger than the frog, with a thick body, a broad back, and the belly swelled and inflated : its skin is considerably thick, and full of tubercles, of a dusky and blackish colour on the back, and spotted on the belly : it is naturally a loathsome and disagreeable object. See plate **CCLXXIX. fig. 2.**

TOAD-FLAX, *linaria*, in botany. See the article **LINARIA**.

TOBACCO, *nicotiana*, in botany, a genus of the pentandria-monogynia class of plants, the corolla of which consists of a single infundibuliform petal, the limb whereof is patulous, and lightly divided into five segments : the fruit is a bilocular capsule, of a nearly oval figure, with a line on each side of it, and containing numerous, kidney-shaped, and rugose seeds. See plate **CCLXXIX. fig. 3.**

Tobacco is a native of the east and west Indies, and particularly the island Tobago, or Tabago ; whence the English name. See the article **TABAGO**.

After sowing tobacco-seeds, the ground is waered every day, and in hot weather covered, to prevent its being scorched by the sun ; and when the plants are

grown to a convenient pitch, they are transplanted into a soil well prepared for their reception : care is also taken to keep this ground clear of weeds, and to pull off the lowest leaves of the plant, that ten or fifteen of the finest leaves may have all the nourishment. When these leaves are ripe, which is known by their breaking when bent, the stalks are cut, and left to dry two or three hours in the sun ; after which they are tied together two and two, and hung on ropes under a shade to be dried in the air. And when the leaves are sufficiently dried, they are pulled from off the stalks, and made up in little bundles ; which being steeped in sea-water, or, for want thereof, in common water, are twisted in manner of ropes, and the twists formed into rolls, by winding them with a kind of mill around a stick : in which condition it is imported into Europe, where it is cut by the tobaccoists for smoking, formed into snuff, and the like. See the article **SNUFF**.

Besides the tobacco of the West-Indies, there are considerable quantities cultivated in the Levant, the coasts of Greece and the Archipelago, the island of Malta and Italy.

The marks of good twist-tobacco, are a fine shining cut, an agreeable smell, and that it have been well kept. Tobacco is either taken by way of snuff, as a sternutatory, or as a masticatory, by chewing it in the mouth, or by smoking it in a pipe. It is sometimes also taken in little longish pellets put up the nose, where it is found to produce very good effects, to attract a deal of water or pituita, unload the head, resolve catarrhs, and make a free respiration ; for the subtle parts of the tobacco in inspiration, are carried into the trachea and lungs, where they loosen the peccant humours adhering thereto, and promote expectoration. Some have left this tobacco in their noses all night ; but this is found to occasion vomiting the next morning. Another thing charged on this way of application, is, that it weakens the sight. When taken in great quantities in the way of snuff, it is found to prejudice the smelling, greatly diminishes the appetite, and in time gives rise to a phthisis. That taken in the way of smoke, dries and damages the brain. Borghi, in a letter to Bartholine, mentions a person who through excess of smoking had dried his brain to that degree, that after

his death there was nothing found in his skull but a little black lump, consisting of mere membranes.

Some people use the infusion of tobacco as an emetic; but it is a very dangerous and unjustifiable practice, and often produces violent vomitings, sickness and stupidity.

Bates and Fuller give some receipts, in which tobacco is an ingredient, with mighty encomiums in asthmatic cases. A strong decoction of tobacco, with proper carminatives and cathartics, given clyster-wise, sometimes proves of good effect in what is usually called the stone-cholic, and also in the iliac passion. A drop or two of the chymical oil of tobacco, being put on the tongue of a cat, produces violent convulsions, and death itself in the space of a minute; yet the same oil used in lint, and applied to the teeth, has been of service in the tooth-ach: though it must be to those that have been used to the taking of tobacco, otherwise great sickness, retchings, vomitings, &c. happen; and even in no case is the internal use of it warranted by ordinary practice.

A strong decoction of the stalks, with sharp-pointed dock and alum, is said to be of good service, used externally, in cutaneous distempers, especially the itch: some boil them for that purpose in urine. The same is said to be infallible in curing the mange in dogs.

Beat into a mash with vinegar, or brandy, it has been found serviceable for removing hard tumours of the hypochondria.

Tobacco makes a considerable article of commerce; that imported from the british plantations, pays a duty of $5\frac{1}{2}$ d. the pound, which is wholly drawn back on exportation: also, if all the duties are paid down at entry, 25 per cent. is allowed in lieu of all former encouragements; or the importer may pay down the old subsidy, which is $\frac{2}{3}$ of a penny per pound, and give bond for the payment of the remaining duties in eighteen months, and only have an allowance of 15 per cent. out of the bondable duties: so that the duties upon a pound of british plantation tobacco, when the bondable duties are secured as

above, amount to $6\frac{1\frac{3}{4}}{100}$ d. which is drawn

back on exportation. But if the importer shall be desirous to discharge his

bond, or any part thereof, before the expiration of eighteen months, he shall be abated upon such bond so much as the discount at the rate of 7 per cent. per annum shall amount to, in proportion to the time unexpired. No tobacco can be imported into the kingdom of Great Britain, otherwise than in casks, chests, or cases; each cask, chest, or case, containing 450 lb. weight of neat tobacco at least, under the penalty of the forfeiture of all such tobacco. Also no tobacco unmanufactured shall be exported but in casks, chests, or cases of 425 lb. weight, or more, of neat tobacco, except what is exported by way of samples: and all tobacco must be shipped from the very same port or place, in the original package, and with the same marks, as it was first imported, without any alteration, except necessary cooperage, under the penalty of the forfeiture of all such tobacco. By an act passed in the twenty-fourth year of his late majesty George II. no tobacco shall be manufactured till an account is given to the chief officer of the customs at the port of importation, of the mark and quantity of the cask so delivered to be manufactured; and if such an account shall not be given in, or is found to be fraudulent, the importer shall forfeit 30 l. for every hoghead, &c. And by the same act, no tobacco, or tobacco-stalks, exceeding 24 lb. nor any snuff, exceeding 10 lb. shall be conveyed by land from the place of importation, without a certificate first obtained from the chief custom-house officers in that port, together with the importer's oath thereto, that the duties were paid or secured at the importation, &c. on pain of forfeiting the tobacco and snuff; and also the carriage and horses, and the carrier to be imprisoned for one month: and if any person shall counterfeit or alter such certificate, or procure the same to be done, he shall forfeit 50 l. for every such offence. Also, if any tobacco be conveyed by water, without being duly entered at the custom-house, and a certificate as above obtained, it shall be forfeited, and the master of the vessel shall also forfeit 6 d. per pound. The penalty for counterfeiting such a certificate is 100 l. What has been said of conveying tobacco from the place of importation holds equally of conveying it from any other place, without a certificate as above.

Tobacco must not be cultivated in England,

land, except in physic gardens, on forfeiture of 40 s. for every rood of ground planted with it. Also, if any persons cut the leaves of walnut-tree, so as to resemble those of tobacco, and sell the same mixed therewith, they shall forfeit 5 s. per pound.

TOBAGO, a small island in the bay of Panama, in South America, situated west long. 82°, north lat. 8°.

TOBAGO, or **TABAGO**, is also the name of one of the Caribbee-Islands. See the article **TABAGO**.

TOBOLSKI, the capital of Siberia, situated at the confluence of the rivers Tobal and Irtis: east longitude 63°, north latitude 57° 30'.

TOCAT, the capital of Amasia, in Asia: east long. 37°, and north lat. 41° 30'.

TOCKAY, a city of Hungary, seventy miles north east of Buda, the wines of which are esteemed the best in Europe.

TOD of *wool*, a quantity containing twenty-eight pounds, or two stone. See the articles **WOOL** and **WEIGHT**.

TODI, a town of Italy, situated on the river Tiber, fifty miles north of Rome.

TOES, called by anatomists *digiti pedis*, are the extreme divisions of the feet, answering to the fingers of the hands. See the articles **FOOT** and **HAND**.

The bones of the toes of both feet are twenty-six in number, sometimes twenty-eight; being much slenderer, except that of the great toe, than those of the fingers: they have also a much less free motion than those of the fingers: the great toe has only two bones, and the rest three; except the little toe in very old people, in whom the two extreme phalanges of the little toe grow together so as to form only one bone; whence we find, in this case, fewer bones in each foot than thirteen.

For the sesamoide bones of the toes, see the article **SESAMOIDE**.

In case of adhesions of the toes of infants, they should be separated either by cutting out the intermediate skin with a pair of scissors, or barely by dividing them with the same instrument: and when this is done, in order to prevent their cohering again, they should be wrapped up in a spiral bandage, dipped in lime-water and spirit of wine.

TOFT, in law-books, denotes a parcel of land, or a place where a messuage has formerly stood.

TOGA, in roman antiquity, a wide wool-len gown, or mantle; which seems to

have been of a semi-circular form, without sleeves; differing both in richness and largeness, according to the circumstances of the wearer, and used only upon occasion of appearing in public.

Every body knows that the toga was the distinguishing mark of a Roman: hence; the *jus togæ*, or privilege of the toga, was the same with the privilege of a roman citizen; *i. e.* the right of wearing a roman habit, and of taking, as they explain it, fire and water through the roman empire.

TOILS, snares or nets used by hunters for catching wild beasts, as deer, &c.

TOILET, a fine cloth of linen, silk, or tapestry, spread over the table in a bed-chamber or dressing-room, to undress and dress upon.

TOISE, a french measure containing six of their feet, or a fathom. See **FOOT**.

TOISON D'OR, a term, in heraldry, for a golden fleece, which is sometimes borne in a coat of arms.

TOLEDO, a city of New Castile, in Spain; the archbishop of which is primate of Spain, &c. and possesses the largest revenue of any archbishop in Europe: it is situated in west longitude 4° 12', and north latitude 39° 45'.

TOLÉN, the capital of an island of the same name, in the province of Zealand, in the United Netherlands, situated four miles north-west of Bergenopzoom.

TOLENTINO, a town of the marquissate of Anconia, in Italy, twenty-four miles south-west of Loretto.

TOLERATION, in matters of religion, is either civil or ecclesiastical. Civil toleration, is an impunity and safety granted by the state to every sect that does not maintain doctrines inconsistent with the public peace: and ecclesiastical toleration, is the allowance which the church grants to its members to differ in certain opinions, not reputed fundamentals.

The term toleration has made a great figure in the disputes among protestants, who have been exceedingly divided about the measures of toleration, or the degrees to which heretics and schismatics are, or are not to be suffered.

TOLESBURG, a port-town of Livonia: east long. 26°, north lat. 59°.

TOLHUYS, a town of Guelderland, in the United Netherlands, situated on the Rhine, nine miles east of Nimeguen.

TOLK, in ornithology, the back, brown, and white mottled tringa. See the article **TRINGA**.

TOLL,

TOLL, in law, denotes a tax or custom paid for passage, or for the liberty of selling goods in a market or fair. Hence, toll booth is a place in a town, where goods are weighed, in order to ascertain the duties thereon.

TOLLENON, among the Romans, a warlike machine, formed in this manner: one beam was fixed very deep in the earth, and on the top of it another, more than twice as long, and moveable upon a center; on one end of this cross-beam were placed a covering of hurdles or planks, within which a few soldiers were put, and by pulling down the other end with ropes, these were raised above the walls of a besieged town.

TOLMEZZO, a town of Friuli in Italy: east long. 13° , north lat. 47° .

TOLNA, a town of Lower Hungary, sixty miles south of Buda.

TOLOSA, a city of Biscay, in Spain: west long. 2° , and north lat. $43^{\circ} 30'$.

TOLU, a port-town of Terra Firma, situated on a bay of the North Sea, an hundred miles south-west of Carthagena.

TOLUIFERA, in botany, a genus of the decandria-monogynia class of plants, the flower of which is composed of five petals, which are inserted into the cup; four of these are strait and equal in size, and are a little longer than the cup; but the fifth is twice as large as these, and is cordated at the end, and has an unguis of the length of the cup. The fruit and seeds are yet unknown. It is so called, from its producing the balsam of peru. See the article **BALSAM**.

TOMAN, or **TOUMAN**, a kind of imaginary money used among the Persians in the keeping of their books, and to facilitate the reduction of money in the payment of considerable sums. See the article **MONEY**.

TOMB, includes both the grave or sepulchre wherein a defunct is interred, and the monument erected to preserve his memory. See **MONUMENT**.

TOMBEC, a town of Brabant, ten miles east of Brussels.

TOME, in matters of literature, denotes a bound book, or writing that just makes a volume. See **BOOK** and **VOLUME**.

TOMENTUM, among botanists, the downy matter which grows on the leaves of some plants,

TOMEUT, a town of Nigritia, in Africa: west long. 11° , north lat. 14° .

TONDEREN, or **TUNDER**, a town of South Jutland, situated on a bay of the

German sea, twenty miles south of Ryben.

TONE, or **TUNE**, in music, a property of sound, whereby it comes under the relation of grave and acute; or it is the degree of elevation any sound has, from the degree of swiftness of the vibrations of the parts of sonorous bodies. See the article **SOUND** and **TUNE**.

Tone is more particularly used for a certain degree or interval of tune, whereby a sound may be either raised or lowered from one extreme of a concord to the other, so as still to produce true melody. See **INTERVAL** and **CONCORD**.

TONGEREN, or **TONGERS**, a town of the bishopric of Liege, in Germany, ten miles north west of Liege.

TONGUE, *lingua*, in anatomy, the primary organ of taste and speech; the figure of which approaches, in some degree, to pyramidal; its anterior part being called apex, and its posterior part the base or root. The upper side is not quite flat, but a little convex, and divided into two lateral halves, by a shallow depressed line called *linea linguae medianâ*. The edges are thinner than the other parts, and a little rounded as well as the point. The lower side reaches only from the middle of the length of the tongue to the point.

The tongue is principally composed of very soft fleshy fibres, intermixed with a peculiar medullary substance, and disposed in various manners. Many of these fibres are confined to the tongue without going any farther; the rest form separate muscles which go out from it in different ways, and are inserted in other parts: all the upper side of the tongue is covered by a thick membrane of a papillary texture, upon which lies another very fine membrane like a kind of epidermis, which is likewise continued over the lowest side, but without papillæ.

Three sorts of papillæ may be distinguished in the upper side of the tongue, capitatae, semi-lenticularis, and villosae. Those of the first kind are the largest, resembling little mushrooms with short stems, or buttons without a neck: they lie on the basis of the tongue, in small superficial fossulae. They resemble small conglomerate glands seated on a very narrow basis, and each of them has sometimes a small depression in the middle of their upper convex side: they occupy the whole surface of the basis of the tongue, and are situated near each other.

other, in such a manner as that the most anterior form an angle; they are glandular papillæ, or small salival or mucilaginous glands, of the same kind with those that are to be described hereafter.

We often observe, about the middle of this part of the tongue, a particular hole of different depths; the inner surface of which is entirely glandular, and filled with small papillæ like these of the first kind. It is called foramen cæcum Morgagnii, as being first described by that author; since that time Vaterus has discovered a kind of salival ducts belonging to it; and Heister found two of these ducts very distinctly, the orifices of which were in the bottom of the foramen cæcum, near each other. He observed the ducts to run backward, divaricating a little from each other; and that one of them terminated in a small oblong vesicle, situated on the side of the small cornu of the os hyoides.

The papillæ of the second kind, or semilenticulares, are small orbicular eminences, only a little convex, their circular edge not being separate from the surface of the tongue. When we examine them in a sound tongue with a good microscope, we find their convex sides full of small holes or pores, like the end of a thimble.

They lie chiefly in the middle and anterior portions of the tongue, and are sometimes most visible on the edges, where they appear to be very smooth, and polished even to the naked eye, and sometimes in living subjects. They soon lose their consistence after death, so that, by rubbing them several times, they may be drawn out in form of small soft pyramids, inclined to one side. The papillæ of the third kind, or villosæ, are the smallest and most numerous. They fill the whole surface of the upper side of the tongue, and even the interstices between the other papillæ. They would be more properly named papillæ conicæ, than villosæ, from the figure which they appear to have, when examined through a microscope in clear water. They are naturally softish, but become extremely flaccid after death; so that by handling them they may be made short and thick, whereas they are naturally long and small.

The fleshy fibres of which the tongue is composed, and which go no further than the tongue, may be termed musculi linguae interiores, or the intrinsic muscles;

and they are the same with what Spigelius named musculi linguales. The fibres these muscles consist of are of three general kinds, longitudinal, transverse, and vertical; and each of these situations admits of different degrees of obliquity. The longitudinal fibres point to the basis and apex of the tongue, and seem partly to be expansions of the musculi styloglossi, hyoglossi, and genio-glossi. The vertical fibres seem likewise to be in part produced by the same genio-glossi, and the transverse by the mylo-glossi.

Besides these mixed productions, there is a distinct plane of longitudinal fibres, which run near the surface of the upper side of the tongue, and a distinct transverse plain under them. All these fibres are partly interwoven, one portion of them terminating at the two edges of the tongue, and the other at the basis and point, without going to any other part; and they lie immediately above those which belong to the genio-glossi. To discover all these different fibres, and their different degrees of direction, we need only cut the tongue longitudinally, after it has been boiled, or long macerated in strong vinegar. The extrinsic muscles, or musculi exteriores, are those which by one extremity make a part of the body of the tongue, and are fixed by the other in some part without the tongue. Of these we reckon four pair, mylo-glossi, stylo-glossi, hyo-glossi, and genio-glossi. In plate CCLXXIX. fig. 5. n°. 1. is represented the human tongue, with its three integuments, which anatomists in general have omitted to remark. Bourdon, indeed, has figured them, but thicker than the life. A A A is the upper superficies of the tongue, on which are visible a multitude of papillary and pyramidal eminences. B is a piece of the exterior tunic, or coat of the tongue; in which are discernable a vast number of nervous papillæ, adhering to its interior surface. C C is the second tunic, called the corpus reticulare of Malpighi. D is the corpus reticulare of other writers. E is the membrane, or corpus papillare nervosum. F F the glands of the tongue; and G the foramen usually found in the hinder part of the tongue.

Nº 2. *ibid.* exhibits a human tongue, in which Heister discovered two remarkable salival ducts, *b* and *d*, in the foramen cæcum A; *c c* is a vesicle at the extremity of the duct *d*, distended with saliva; and *e* is the place where this duct disappeared:

peared : *ff* shew the course and situation of these ducts. The fabric and structure of the oscula, expressed at *b* and *d*, was singular; having the appearance of valves or caruncles, that had collapsed, so that they did not appear as represented in the figure, unless forced open by inflation: *b* is the epiglottis, *i* its anterior ligament, *k* muscular fibres arising from the substance of the tongue, *ll* two little ossicles of the os hyoides, *m m* the extremities of the horns of the os hyoides, *nn* glands and papillæ of various size, about the middle of the tongue; and *o* the apex of the tongue bent downwards.

TONGUE-TIED, the popular name for a distemper of the tongue in children, when it is tied down too close to the bottom of the mouth, by a ligament connected all along its middle, and called its *frænulum*, which requires to be divided, to give the tongue its proper motion. See the article *FRÆNUM*.

This is sometimes the case in adults, but oftener in children, who cannot then exert their tongues to suck. This is, however, by no means so common as the women usually imagine; not so much as one child in a thousand being afflicted with it; nor is the operation in cutting it of little consequence, since often bad accidents follow it, and sometimes the loss of the child's life. When the infant can put its tongue out of its mouth, the *frænulum* wants no incision; but when the tongue cannot be extended beyond the teeth, the operation is necessary. To perform this, the end of the tongue should be covered with a linen-rag, and held with the fingers to prevent its slipping, and the ligament of the tongue running between the ranular veins and internal salival ducts, is to be divided by a pair of obuse-pointed scissors, till it give room enough for sucking or speaking; but in doing this, great care must be taken not to wound the salival ducts, or the proper veins and arteries of the tongue; for children have been known to perish upon the spot, from the cutting the ranular veins in this operation. Midwives often tear this ligament with their fingers, as soon as the child is born; but this is a dangerous and bad practice.

TONIC, *tonicus*, in medicine, is applied to a certain motion of the muscles wherein the fibres, being extended, continue their extensions in such a manner, as that the part seems immoveable, though in reality it be in motion.

TONNAGE, or **TUNNAGE**. See the article *TUNNAGE*.

TONNINGEN, a port-town of south Jutland, situated at the mouth of the Eyder, in east long. $8^{\circ} 40'$, north lat. $54^{\circ} 40'$.

TONQUIN, a kingdom of the further India, bounded by the provinces of Yunam and Canton, in China, on the north; by Cochin China, on the south; and by the kingdom of Laos, on the west; lying between 101° and 108° east long. and between 17° and 26° north lat. Its capital is Keccio, or Cachao.

TONSBURG, a port-town of Norway, in the province of Aygerhuys, situated on the Scaggerack-sea, thirty miles west of Fredericksat.

TONSILS, *tonsillæ*, in anatomy, two remarkable glands, situated one on each side of the mouth, near the uvula, and commonly called almonds of the ears, from their resembling almonds in figure. Their use is to secrete a mucous humour for lubricating the passages: this they discharge by several irregular but conspicuous foraminæ into the mouth.

The tonsils are apt to be inflamed from taking cold, for which Heister first advises a gentle purge of tamarinds, senna, and cream of tartar; and this to be repeated to the third or fourth dose, if there be occasion: in the intermediate times, the diaphoretic attemperating and nitrous medicines are to be given in powders, and a large quantity of diluting liquors allowed, which should be gently acidulated, and have a small quantity of nitre dissolved in them: gargarisms made of decoctions of bistort-root, red-roses, and other gentle astringents, are also to be frequently used; and the frequent washing the feet in warm water, often has a very remarkable good effect.

If after four or five days the distemper is found not to give way to these means, but the tumour still remains, there is then but little hopes to be had of its resolution, and a very different end is to be attempted: emollient gargarisms are now to be used, and maturing plasters externally applied, such as diachylon with the gums, and the like; and suppurating cataplasms are to be applied to the whole neck and throat: these methods are to be continued till the tumour either bursts of itself, or is so ripe as to be fit for opening by the hand of the surgeon. After this has been done, and the matter is discharged, gargarisms must be used of decoctions of some vulnerary herb; or common green

tea, sweetened with honey of roses, may be used to serve the purpose. The mouth and throat are to be frequently washed with this till the part is healed. It is to be observed, however, that the resolution of these tumours is never to be despaired of, not even during the use of the suppurating medicines, for it is often seen that the tumour has been wholly dissolved even during the use of these means, the resolution often being extremely slow.

This is a very troublesome complaint, and with some persons is apt to return very frequently; the best preservative against it is a moderate diet and bleeding, about the time of the equinoxes, either in the arm or foot. Some have found it necessary to open an issue in the arm, in this case, and have been by this means perfectly cured; but on its drying up have always found the disease return.

TONSURE, in ecclesiastical history, a particular manner of shaving or clipping the hair of ecclesiastics or monks.

The ancient tonsure of the clergy was nothing more than polling the head, and cutting the hair to a moderate degree, for the sake of decency and gravity: and the same observation is true, with respect to the tonsure of the ancient monks. But the romanists have carried the affair of tonsure much farther; the candidate for it kneeling before the bishop, who cuts his hair in five different parts of the head, *viz.* before, behind, on each side, and on the crown.

TOOL, among mechanics, denotes in general any small instrument, used as well for making other more complex instruments and machines, as in most operations in the mechanic arts. See the article **INSTRUMENT**.

The tools of joiners, smiths, &c. may be seen delineated and described under the articles **JOINERY**, **SMITHERY**, &c.

TOOTH, *dens*, in anatomy, a little, very hard, and smooth bone, fixed in a proper alveolus or socket in the jaw, in the manner of a nail; and serving to masticate or chew the food. See the articles **FOOD**, **CHYLE**, and **CHYLIFICATION**.

The natural colour of the teeth, in mankind, is white; and their number from twenty-eight to thirty-two; fourteen, fifteen, or sixteen being placed in each jaw, if the number be perfect. The teeth are usually divided into the four incisores, or fore-teeth; the two canine, eye-teeth, or dog-teeth; the eight molares, or

grinders, in each jaw, and two dentes sapientie.

The bodies of the teeth are composed of a double substance, a stony or porcelain-like matter, and a medullary one: their roots are sometimes simple, as in the incisores, canini, and foremost of the molares; and sometimes double, triple, or quadruple, as in the hinder molares. The cavities of the teeth are covered with a vasculo-nervous membrane, and the foraminula, or little holes, in the ends of them, serve for the ingress of the vessels which afford them nutrition and sensation.

The uses of the teeth are to break our food, to assist us in speaking, and to add to the beauty of the face.

For the breeding of the teeth, in infants, see the article **DENTITION**.

Fossil teeth of fishes are known by three names; the *glossopetræ*, the *bufonitæ*, and the *plectronitæ*. See the articles **GLOSSOPETRÆ**, &c.

As to the cleaning of foul teeth, see the article **DENTIFRICE**.

TOOTH-ACH, *odontalgia*, a very painful disorder, caused by an impure serum which corrodes and rends the ligaments and nervo-glandulous coats, by which the teeth are kept firm in their sockets: its seat may also be in the cavity or internal parts of the teeth themselves.

The whole intention of cure, in this disorder, consists in deriving and diverting the impure scorbutic serum from the head, and then carrying it off by proper emunctories. This is to be done by saline, emollient, and purgative clysters; by warm pediluvia of rain-water and wheat-bran, with venice-soap, used just before bed-time; by laxatives of manna and cassia dissolved in whey or asses-milk, or mineral waters: if the patient is plethoric or full of blood, phlebotomy in the foot will be proper, to derive the humours from the head. Sudorific remedies are also proper, but more especially an electuary made of rob of elder-berries, burnt hart's horn, diaphoretic antimony, and a few grains of nitre: or, an ounce of the rob may be taken in broth, to promote a diaphoresis; and it may be used externally, dissolved in beer, in the manner of a gargle, which will yield immediate relief to the patient.

When the patient is subject to catarrhs, is scorbutic or cachectic, then mineral waters are most proper; and if the pa-

tient is of a weak bilious constitution, the water should be mixed with asses-milk. Outwardly may be applied bags, filled with paregoric and emollient species; such as elder, melilot, and camomile-flowers, bay and juniper-berries, caraway and millet-seeds, and decrepitated salt: they must be laid on warm, and are very safe. A drop or two of oil of cloves or box, applied to a carious tooth with cotton, are medicines not to be despised; and camphorated spirits of wine, mixed with saffron, castor, and opium made into a liniment, and laid to the gums and hollow tooth, often gives the patient ease. When the tooth-ach proceeds from a rotten, hollow tooth, it will be best to burn the little nervous cord, which is the seat of the pain, with an acute cautery; and then the cavity may be filled up with a mixture of wax and mastic. But if this cannot be done, the only remedy left is to have the tooth drawn.

Allen advises to rub the tooth, that is painful, with the root of the iris lutea, or the yellow fleur-de-luce; or a pill may be made of equal quantities of camphor or opium, and put into the hollow tooth; and, lastly, some greatly recommend a small plaster of tacamalzac, laid on the side of the face.

TOOTH-DRAWING, the operation of pulling out a carious, or otherwise injured tooth.

This art, according to Cicero, was invented by *Æsculapius*, in whose temple the antients hung up a pair of leaden pullicans, very properly signifying that no teeth were fit to be pulled out, but such as might be removed with a leaden forceps; that is, such as were loose and ready to fall out of themselves; for they very little consult their own welfare, who pull out their teeth while firm and sound; for drawing the teeth is not only a painful operation, but often brings on bad accidents, and sometimes even hazards the patient's life.

Tooth drawing, however wrong in many cases, yet is certainly right and necessary in others. 1. In children, for the removing their lacteal, or deciduous teeth; for when these are left too long in their sockets, they displace the new ones, and turn them awry. 2. In infants it is also necessary to draw such teeth as grow out of the palate, or out of improper parts of the mouth, and are placed so as to impede their speaking or sucking. 3. In the tooth-ach proceeding from a tooth's be-

ing carious, and giving way to no medicines, drawing is the last resort, and is absolutely necessary. 4. Those teeth ought to be drawn which by their irregular figure and position lacerate the gums and lips, and cannot be brought into shape by the file. And, lastly, it is sometimes necessary to draw a tooth for the curing a fistula, or ulceration of the gums near the roots of the teeth.

The regular method of drawing them is this: if the tooth is in the lower jaw, the patient must be seated on a low seat, or on the floor, and if in the upper jaw, he must be placed on a high stool or table; then the proper instrument is to be selected, and the tooth carefully drawn as a nail out of a piece of wood. But this must never be done while the gums are inflamed, swelled, or otherwise distempered.

TOPARCHY, a little state or seigniory, consisting only of a few cities or towns; or a petty country, governed and possessed by a toparch, or lord. See the article **GOVERNMENT**.

TOPAZ, in natural history, a gem called by the antients chrysolite, as being of a gold-colour. See the article **GEM**.

The topaz, when perfect and free from blemishes, is a very beautiful and valuable gem; it is, however, very rare in this state. It is of the number of those gems which are found only in the round or pebble form, there never having been yet seen a true and genuine topaz of a columnar figure, tho' the far greater part of what our jewellers call such, are in that form. The greatest part of the true topazes are no larger than grains of a coarse seed; among these there are, however, some met with of the size of a pea, and some much larger, though those are very rare. It is of a roundish or oblong figure in its native or rough state, and usually is flattened on one side, and is generally of a bright and naturally polished surface, tolerably transparent. They are ever of a fine yellow colour; but they have this like the other gems, in several different degrees; the finest of all are of a true and perfect gold-colour, but there are some much deeper, and others extremely pale so as to appear scarce tinged. The oriental topaz is equal to the ruby in hardness, and is second only to the diamond in lustre. The topazes of the other part of the world fall off greatly from this hardness, but the purest of the genuine ones are considerably harder than crystal. The topaz, on being thrown into a char-

coal fire, entirely loses its colour, and when taken out, is a very fine colourless stone, undistinguishable from that known by the name of the white sapphire: upon the whole it appears, that the oriental coloured gems are all much alike in their matter, differing scarce at all, except in colour, and that when they are found either naturally colourless, or rendered so by art, it is not easy to distinguish one of them from the other.

The finest topazes in the world are found in the East-Indies, but they are very rare there of any great size: the great mogul, however, at this time, possesses one, which is said to weigh an hundred and fifty-seven carats, and to be worth more than twenty thousand pounds. The topazes of Peru come next, after these, in beauty and in value; the european are principally found in Silesia and Bohemia, and are generally full of cracks and flaws, and of a brownish yellow.

Besides all these degrees of value in the genuine topazes, our jewellers keep what they call a kind of them, inferior greatly to the true ones; all these are common hexangular crystals, coloured to a paler or deeper yellow in mines: these they cut into stones for rings, and sell under the name of topazes; and most of the stones we see under that name are such.

The antients have said much of the topaz's virtue: it is said to be a high cordial and sudorific, and to have been given also in hæmorrhages with great success. But whatever virtues it may possess, we are not to expect to find them in the stones our druggists now keep under the name of topazes, these being no other than fragments of a yellowish plated spar, common in lead mines, and impregnated more or less with that metal. The topaz itself seems to owe its colour to lead, but the quantity it contains of that is so very inconsiderable, that it can be of no effect in the body, and may very well be supposed to leave it in the state of crystal; which seems as much as we are to imagine really of any of the gems; but this spar, sold in the place of topaz, not only discovers that it holds a great deal of lead by its weight, but lead has actually been separated from it, in no less quantity than one fifth of its weight.

TOPE, in ichthyology, the squalus with the nostrils near the mouth, and small holes near the eyes. See SQUALUS.

TOPHUS, in medicine, denotes a chalky or stony concretion in any part of the bo-

dy, as the bladder, kidneys, &c. but especially in the joints. See GOUT.

TOPIC, in rhetoric, denotes a probable argument, drawn from the several circumstances of a fact, &c. Hence the art of finding and managing such arguments, is called by the antients *topica*, *τοπικα*. See the article INVENTION.

TOPICS, or TOPICAL MEDICINES, are the same with external ones, or those applied outwardly to some diseased and painful part: such are plasters, cataplasms, unguents, &c. See the articles PLASTER, &c.

TOPOGRAPHY, a description or draught of some particular place, or small tract of land, as that of a city or town, manor or tenement, field, garden, house, castle, or the like; such as surveyors set out in their plots, or make draughts of, for the information and satisfaction of the proprietors.

TOPSHAM, a port-town of Devonshire, situated on the river Ex, about four miles south of Exeter.

TORBAY, a fine bay in the English channel, a little east of Dartmouth, where the prince of Orange, afterwards king William III. landed, on Nov. 5, 1688.

TORBOLE, a town of the bishopric of Trent, in Italy, fourteen miles south-west of the city of Trent.

TORCELLA, a port-town of Catalonia, in Spain, situated at the mouth of the river Ter, in east long. $2^{\circ} 50'$, and north lat. 42° .

TORCELLO, a town and island of Italy, seven miles north of the city of Venice.

TORCH, *tada*, a luminary used in several church-ceremonies, funerals, &c. and more usually called flambeau. See the articles FLAMBEAU and TAPER.

TORCH THISTLE, *cereus*, or *cactus*, in botany. See the article CACTUS.

TORCULAR, in surgery, the same with the tourniquet. See TOURNEQUET.

TORDESILLAS, a town of Spain, forty miles north-east of Salamanca.

TORDYLIUM, in botany, a genus of umbelliferous plants, belonging to the pentandria-digynia class: the general flower of which is uniform and radiated: the particular ones of the disc consist of five inflexo-cordated and equal petals; the fruit is roundish, compressed, and surounded longitudinally with dentils; the seeds are two, roundish, and almost plane. This genus comprehends hedge-parsley, candy hart-wort, &c. the seeds of which last are accounted carminative, and alexipharmic,

pharmic, but are very little used in the present practice.

TORE, *torus*, in architecture, a large round moulding, used in the bases of columns. See the article **MOULDING**.

TOREUMATOGRAPHY, a greek term, signifying the knowledge or rather description of antient sculptures and basso-relievos.

TOREUTICE, *τορευτική*, that part of sculpture otherwise called turning. See the article **TURNING**.

TORGAW, a town of the dutchy of Saxony, situated on the river Elbe, thirty-five miles north-west of Dresden.

TORIES, or **TORYS**, in the history of England, a faction or party, opposed to the whigs. See the article **WHIGS**.

The tories are great sticklers for the prerogative of the crown, as the whigs are for the liberties and privileges of the people: though, in truth, the principles of the moderate people of both parties do not greatly differ.

TORMENTIL, *tormentilla*, in botany, a genus of the icosandria-pentagynia class of plants, with a roseaceous flower, consisting of four obversely cordated, plane, and patent petals; the stamina are sixteen subulated filaments, about half the length of the cup; the seeds are eight in number, oblong, obtusely acuminate, and contained in the cup, which forms a kind of globose capsule.

Tormentil-root has an austere styptic taste, accompanied with an aromatic flavour: it is one of the most agreeable and efficacious vegetable astringents: there are also a tincture and a distilled water of it, the former of which possesses all the virtues of the simple.

TORMES, a river of Spain, which runs from south-east to north-west, through the province of Leon, passes by Salamanca, and afterwards falls into the river Douro in Portugal.

TORMINA, **GRIPES**, in medicine. See the article **COLIC**.

TORNADO, or **TURNADO**, a sudden and vehement gust of wind from all points of the compass, frequent on the coast of Guinea. See the articles **HURRICANE**, **WHIRLWIND**, &c.

TORNAW, a town of Upper Hungary, sixty miles north-east of Buda.

TORNE, or **TORNEA**, the capital of Torne Lapmark, a province of Sweden, situated at the mouth of the river Torne, at the bottom of the Bothnic gulph, up-

on a little island made by the river, four hundred miles north of Stockholm: east long. 22° 45', north lat. 65° 45'.

TORNESOL, or **TURNESOL**. See the article **TURNESOL**.

TORO, a city of Leon, in Spain, situated on the river Douro, thirty-five miles west of Valladolid.

TORPEDO, the **CRAMP** or **NUMB-FISH**, in ichthyology, a species of raia, the body of which is perfectly smooth, and considerably broad in proportion to its length; the rostrum or snout is oblong and subacute; the back is somewhat gibbose; the belly is flat, and the sides are terminated by broad fins; its colour on the back is a dusky greyish, and the belly is white. See the article **RAIA**.

The most singular property of this fish is, that, when out of the water, it affects the hand or other part that touches it, with a sensation much like that which we call the cramp; the shock is instantaneous, and resembles that given by electricity, only that the effect lasts longer: this is all the fish can do; but those who have related it, have raised the effects almost into miracles. Reaumur has given a long memoir, wherein he endeavours to account for this singular phenomenon, which he resolves into the instantaneous action of a vast multitude of small muscles on the surface of the body of the fish: but there seems something more required, in order to the perfectly explaining so odd an effect. See plate **CCLXXIX**. fig. 4.

TORQUATA, in zoology, a name given to the natrix, or water-snake, from the remarkable ring it has about its neck. See the article **NATRIX**.

TORQUE, in heraldry, denotes a round roll of cloth, twisted and stuffed: such is the bandage, frequently seen in armories, about the heads of Moors, &c. It is always of the two principal colours of the coat; and is accounted the least honourable decoration worn on the helmet, by way of crest.

TORREFACTION, in chemistry, is the roasting or scorching of a body by the fire, in order to discharge a part either unnecessary or hurtful in another operation; as sulphur is thus discharged from an ore, before the metal can be obtained to advantage. See **ROASTING**.

TORREJO, a town of New Castile, in Spain, fifteen miles south of Madrid.

TORRENT, *torrens*, in geography, denotes a temporary stream of water, falling

ing suddenly from mountains, whereon there have been great rains, or an extraordinary thaw of snow.

TORRES, a port-town of Granada, in Spain, forty-five miles south-west of the city of Granada: west long. $4^{\circ} 26'$, north lat. $36^{\circ} 45'$.

TORRICELLIAN EXPERIMENT, a famous experiment made by Torricelli, a disciple of the great Galileo, which has been already explained under the article **BAROMETER**.

TORRID ZONE, among geographers, denotes that tract of the earth lying upon the equator, and on each side as far as the two tropics, or $23^{\circ} 30'$ of north and south lat. The torrid zone was believed, by the ancients, to be uninhabitable; but is now well known to be not only inhabited by the natives of those hot climates, but even tolerable to the people of the colder climates towards the north and south; the excessive heat of the day being there tempered by the coldness of the night. See the article **HEAT**.

TORRIGLIA, a town of the territory of Genoa, in Italy, situated ten miles north-west of Genoa.

TORRINGTON, a market-town of Devonshire, situated on the river Towbridge, twenty-six miles north-west of Exeter.

TORROCK, in ornithology, the larus with a white head, and a black spot on each side. See the article **LARUS**.

TORSIL, a town of Sweden, in the province of Sunderland, situated on the Mellerlake, forty three miles west of Stockholm.

TORT, in law, a French term, signifying wrong or injury.

TORTOISE, *testudo*, in zoology. See the article **TESTUDO**.

TORTONA, a city of Italy, in the duchy of Milan, situated on the south side of the Po, thirty two miles south-west of Milan.

TORTOSA, a city of Catalonia in Spain, situated on the river Ebro, ninety miles south-west of Barcelona: east long. 15° , and north lat. $40^{\circ} 45'$.

TORTUGA, an island of the West Indies near the north coast of Hispaniola.

TORTUGA is also an island on the coast of Terra Firma.

TORTURE, a grievous pain inflicted on a criminal, or person accused, to make him confess the truth.

TOSA, a port-town of Catalonia, in Spain, thirty-seven miles north-east of Barcelona.

TOSCANELLA, a town of Italy, thirty-five miles north of Rome.

TOTANUS, or **GODWIT**, in ornithology, the red-legged tringa, with a black beak, red at the base. See **TRINGA**.

TOTNESS, a borough-town of Devonshire, twenty-three miles south-west of Exeter. It sends two members to parliament.

TOTTED. A good debt to the king is, by the foreign opposer, or other officer of the exchequer, noted for such by writing the word *tot*, *q. d. tot pecunia regi debentur*; whence it is said to be totted. Also that which is paid is to be totted.

TOUCAN, in ornithology, a species of ramphastos, of a middle size between our common magpie and the thrush, but having a beak thicker and longer than its whole body: this beak is hooked at the end, and is of a very thin substance, not exceeding the thickness of a membrane, and very light and hollow, yet bony in substance, and very bright and shining. It has a sort of toothed edge, which prevents its shutting closely, and, giving passage for the air, enables the bird to live without nostrils. It is yellowish on the outside and red within, and is covered with a sort of scaly substance, easily scraped off with a finger at the edge.

The head of this bird is large in proportion to its body, and is black on the crown; the rest of it, and the neck and back, are slightly variegated with white; its breast is of a bright orange colour, its belly and thighs of a very fine and bright red, and the tail is black but red at the end. See plate **CCLXXXI. fig. 3.**

TOUCAN, in astronomy, a constellation of the southern hemisphere, consisting of eight small stars, and otherwise called *anser americanus*.

TOUCH-NEEDLE, among assayers, refiners, &c. little bars of gold, silver, and copper, combined together in all the different proportions and degrees of mixture; the use of which is to discover the degree of purity of any piece of gold or silver, by comparing the mark it leaves on the touch-stone, with those of the bars.

The metals usually tried by the touch-stone, are gold, silver, and copper, either pure, or mixed with one another in different degrees and proportions, by fusion. In order to find out the purity or quantity of baser metal in these various admixtures, when they are to be examined, they are compared with these needles, which are mixed in a known proportion, and prepared for this use. The metals of these needles, both pure and mixed, are all made into laminæ or plates, one

twelfth

twelfth of an inch broad, and of a fourth part of their breadth in thickness, and an inch and half long; these being thus prepared, you are to engrave on each a mark indicating its purity, or the nature and quantity of the admixture in it.

The black rough marbles, the basaltes, or the softer kinds of black pebbles, are the most proper for touch-stones. See **MARBLE**, **BASALTES**, &c.

Now the method of using the needles and stone is this: the piece of metal to be tried, ought first to be wiped well with a clean towel, or piece of soft leather, that you may the better see its true colour; for from this alone an experienced person will, in some degree, judge before-hand what the principal metal is, and how, and with what debased.

Then chuse a convenient not over large part of the surface of the metal, and rub it several times very hardy and strongly against the touch-stone, that in case a deceitful coat or crust should have been laid upon it, it may be worn off by that friction: this, however, is more readily done by a grind-stone, or small file, if you have them at hand. Then wipe a flat and very clean part of the touchstone, and rub against it, over and over, the just mentioned part of the surface of the piece of metal, till you have, on the flat surface of the stone, a thin metallic crust, an inch long, and about an eighth of an inch broad: this done, look out the needle that seems most like to the metal under trial, wipe the lower part of this needle very clean, and then rub it against the touch-stone, as you did the metal, by the side of the other line, and in a direction parallel to it. When this is done, if you find no difference between the colours of the two marks, made by your needle and the metal under trial, you may with great probability pronounce that metal and your needle to be of the same alloy, which is immediately known by the mark engraved on your needle. But if you find a difference between the colour of the mark given by the metal, and that by the needle you have tried, choose out another needle, either of a darker or lighter colour than the former, as the difference of the tinge on the touch-stone directs; and by one or more trials of this kind you will be able to determine which of your needles the metal answers, and thence what alloy it is of, by the mark of the needle; or else you will find that the alloy is extraordinary, and not to be

determined by the comparison of your needles.

TOUL, a city of Lorrain, twelve miles west of Nancy.

TOULON. } See { **THOULON**.
TOULOSE. } { **THOULOSE**.

TOUR, a french term, frequently used for a journey or progress through one or more countries.

TOURN, or **TURN**, in law. See the article **TURN**.

TOURNAMENT, or **TURNAMENT**. See the article **TURNAMENT**.

TOURINE, a town of the bishopric of Liege, thirteen miles north-east of Namur.

TOURNAY, a city of Flanders, in the austrian Netherlands, situated on the river Scheld, thirteen miles east of Lisle: east long. $3^{\circ} 30'$, and north lat. $50^{\circ} 37'$.

TOURNEFORTIA, in botany, a genus of the pentandria-monogynia class of plants, the flower of which consists of a single petal, in form of an oval tube, longer than the calyx, divided into five slight segments somewhat broad and pointed, and spread open; the fruit is a globose berry, containing two cells; and the seeds are of an oval figure, two in number, and separated by the pulp.

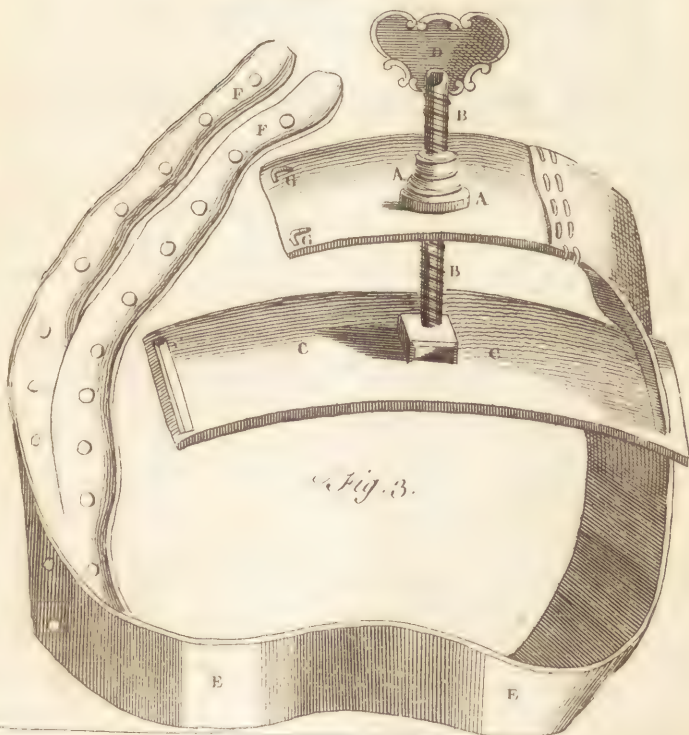
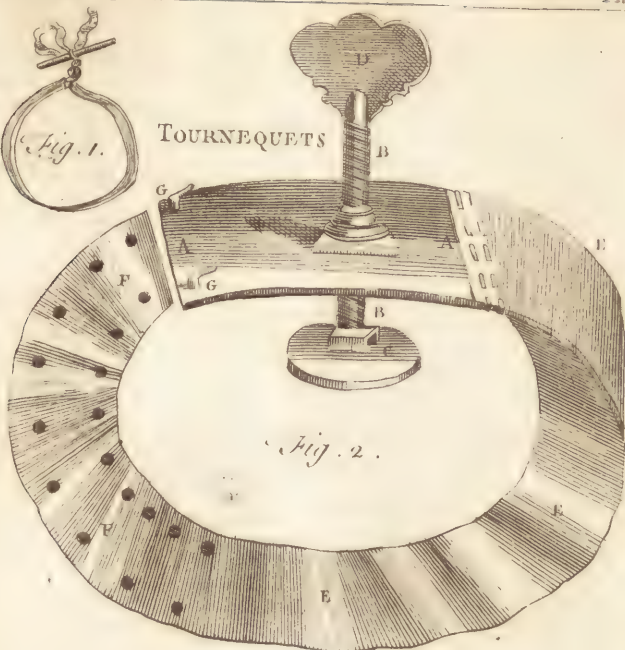
TOURNEQUET, in surgery, an instrument made of rollers, compresses, screws, &c. for compressing any wounded part, so as to stop hæmorrhages. See the article **HÆMORRHAGE**.

The common tournequet is very simple, consisting only of a roller, which, with the help of a small stick, serves to stop the effusion of blood from large arteries, in amputations, by forcibly tying up the limb. The things necessary for this are a roller, of a thumb's breadth, and of an ell in length, a small cylindrical stick, a conglomerated bandage, two fingers thick, and four long, some compresses of a good length and about three or four fingers breadth, to surround the legs and arms, and a square piece of strong paper or leather, about four fingers wide. See plate **CCLXXX**. fig. 1.

The manner of applying this instrument is this; the rolled bandage is to be applied to the trunk of the wounded artery length ways, covering it, in a contrary direction, with compresses surrounding the foot, leg, or arm, as it were with a ring; the roller must be passed twice round these applications, and fastened in a knot, but so loosely that you may easily introduce your hand between it and the



TOURNEQUETS





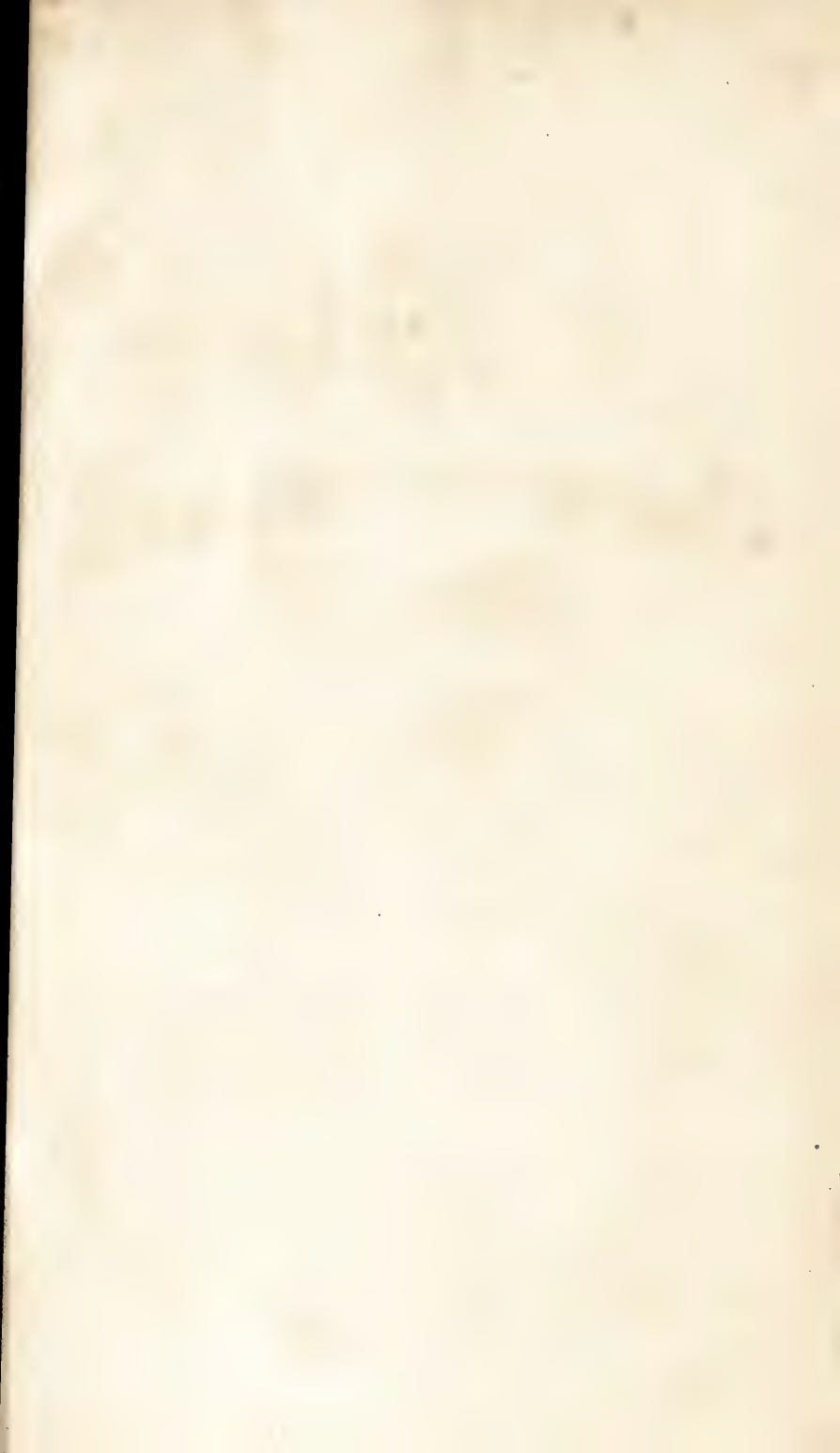


Fig. 1. TOURNEQUETS

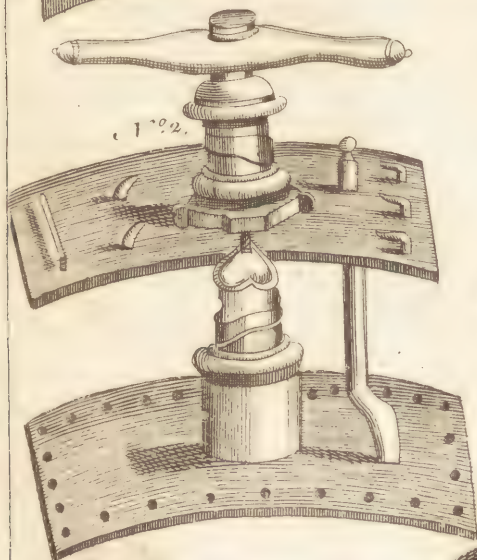
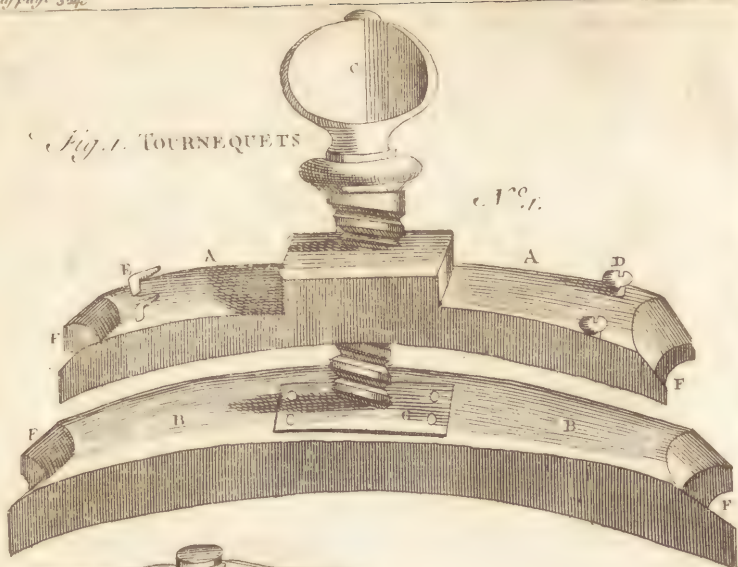


Fig. 2. TRAVERSES

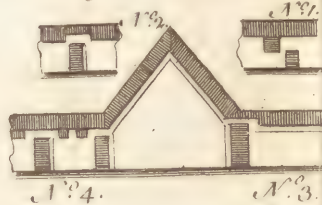


Fig. 4. TRAVERSE



part: the leather or thick paper must now be nicely placed under it, upon the external part of the leg, and the roller tightened by degrees, by turning round the stick, which is to be introduced into the knot; this to be done till the hæmorrhage is entirely stopped: the stick must now be kept in this situation till the wound is properly treated, and the return of the hæmorrhage is prevented. When this end is acquired, the tournequet is to be loosened, or entirely taken off, as shall be judged most convenient; but where it is applied to the arm, the rolled bandage is to be placed near the axilla, in the internal part of the humerus, and the stick in this case is to be fastened on the opposite side, the situation of the artery there requiring this position: and when it is to be applied to the thighs, the bandage is to be put as the case shall require, either to the upper part of the thigh, or just over the knee.

But besides the common tournequet, there are other more complex forms of this instrument. *Ibid.* fig. 2. is a brass-tournequet, for stopping the hæmorrhages in wounds of large arteries; where A A is a brass-plate, somewhat bent; B B, a strong brass-screw; C, a round plate, to be fixed upon the wound; D, the button which turns the screw; E E, a strong leather-belt, to surround the wounded part; F F, part of the belt pierced with holes, whereby it may be fixed upon the belt G G, and lengthened and shortened according to the size of the limb.

Ibid. fig. 3. is another brass-tournequet, after Petit's manner, the use and application of which will be easily understood from the description of fig. 2.

In plate CCLXXXI. fig. 1. n^o 1. is delineated a wooden tournequet, where A A is the upper part; B B, the lower part; C, the screw; D, the two small iron-screws, to which a leather or silk belt is to be fixed; E, hooks, on which to fasten the other end of the belt; F F, the ends of the upper and lower parts of the instrument, hollowed to receive the belt, and keep it steady in its situation.

Ibid. n^o 2. is another kind of tournequet, made of iron, the parts and uses of which will be easily conceived from what has been already said.

TOURNON, a town of Languedoc, in France, fifty miles south of Lyons.

TOURS, a city of France, sixty miles south-west of Orleans.

TOWAGE, the hawling or drawing of a

ship, barge, &c. by men or beasts, or by another ship or boat, fastened to her, in order to make her enter a port, ascend a river, &c.

TOWER, *turris*, a tall building, consisting of several stories, usually of a round form, though sometimes square or polygonal.

Towers are built for fortresses, prisons, &c. as the Tower of London, the Tower of the Bastile, &c.

The Tower of London is not only a citadel, to defend and command the city, river, &c. but also a royal palace, where our kings, with their courts, have sometimes lodged: a royal arsenal, wherein are arms and ammunition for sixty thousand soldiers; a treasury for the jewels and ornaments of the crown; a mint for coining of money; the great archive, wherein are preserved all the antient records of the courts of Westminster, &c. and the chief prison for state criminals.

TOWN, a place inhabited by a considerable number of people, being of a middle size between a city and village.

Hanse-TOWNS. See **HANSE**.

TOXICODENDRON, the **POISON-OAK**, in botany, a species of rhus, or sumach, with a smooth and striated berry, containing a sulcated and compressed nucleus. See the article **SUMACH**.

Poison-oak is said to poison two ways, by handling of it, and by the smell. The scent of it, when cut down in the woods, has poisoned many people, and many more have suffered by it while burning in their fires. People with only handling it have been made blind for several days; and persons who sit near a fire when it is burning, are often swelled and choaked up in all parts of the body, in a terrible manner.

TOXICUM, **POISON**. See **POISON**.

TOZZIA, in botany, a genus of the didyma-angiospermia class of plants, with a monopetalous ringent flower; the upper lip of which is bifid, and the lower one trifid; the fruit is a globose unilocular capsule, containing an ovated seed.

TRABEATION, in the antient architecture, the same with entablature. See the article **ENTABLATURE**.

TRACES of the brain, among the cartesians, denotes the impressions which sensible objects make on the fine fibres of the brain, by means of the organs of sense; on which impressions memory, imagination, &c. are supposed, in a great measure, to depend. See **MEMORY**, &c.

TRA-

TRACHEA, in anatomy, called also *aspera arteria*, and in english the wind-pipe, is a tube or canal, extended from the mouth to the lungs; its situation is in the middle and anterior part of the neck; and it is connected with the fauces, the lungs, and the œsophagus. Anatomists commonly divide it into two parts, the larynx, and *aspera arteria* properly so called. See the article **LARYNX**.

The trachea, or *aspera arteria* properly so called, is that whole cartilaginous canal, extended from the larynx, which is only its mouth or entrance, to the bronchia or lungs; being, in some measure, of a conic figure. Its beginning is cylindrical, and capable of admitting a finger; and its other end is somewhat narrower. It enters the thorax under the sternum, and is there divided into two branches, before it enters the lungs: it is composed of eighteen or nineteen, sometimes but sixteen, sometimes twenty, cartilaginous rings, and four coats. These rings are imperfect, the hinder part of the trachea being membranaceous. Of the four coats, the exterior is membranaceous, the second glandulous, the third muscular, and the fourth or internal covering is tendinous and robust.

The uses of the trachea are, to assist in deglutition, and to be assistant to the lungs: on the exterior part of it are the thyroide and bronchial glands, which secrete an humour to moisten it: its arteries are from the external carotids, the veins from the jugulars, and the nerves from the recurrent ones of the plexus cervicalis. See the articles **GLAND**, **ARTERY**, **VEIN**, &c.

The tracheæ of vegetables are certain air-vessels, discernible in many plants, but in none more distinctly than in the melon.

TRACHELIUM, in botany, a genus of the pentandria-monogynia class of plants, with a funnel-fashioned flower, divided into five segments at the limb; the fruit is a roundish obtusely trilobous capsule, containing a great number of very minute seeds.

TRACHENBERG, a town of Silesia, twenty five miles north of Breslaw.

TRACHEOTOMY, in surgery, the name of an operation otherwise called bronchotomy. See **BRONCHOTOMY**.

TRACHINUS, in ichthyology, a genus of the acanthopterygeous fishes, the opercula of whose gills are pointed, and the eyes placed near one another, in the

upper part of the head; there are two back-fins, and the first very short.

To this genus belong the draco and uranoscopus. See the articles **DRACO** and **URANOSCOPUS**.

TRACING, or **TRAINING**, in mineralogy. See the article **TRAINING**.

TRACT, in geography, an extent of ground, or a portion of the earth's surface.

TRACT, in matters of literature, denotes a small treatise, or written discourse, upon any subject.

TRACTION, the act of drawing, whereby a thing is brought nearer to the mover.

TRACTRIX, in geometry, a curve otherwise called *catenaria*. See **CATENARIA**.

TRADE, in general, denotes the same with commerce, consisting in buying, selling, and exchanging of commodities, bills, money, &c. See **COMMERCE**, **COIN**, **MONEY**, **COMPANY**, &c.

TRADE-WINDS, denote certain regular winds at sea, blowing either constantly the same way, or alternately this way and that; thus called from their use in navigation, and the indian commerce.

The trade winds are of different kinds, some blowing three or six months of the year one way, and then the like space of time the opposite way; these are very common in the indian seas, and are called monsoons. See the article **MONSOON**.

Others blow constantly the same way; such is that general wind between the tropics, which off at sea, is found to blow all day long from east to west. For the phenomena of each, with their physical causes, see the article **WIND**.

TRADESCANTIA, in botany, a genus of the hexandria-monogynia class of plants, the flower of which consists of three orbiculated, plane, and very patent petals; and its fruit is an oval trilobular capsule, containing a few angulated seeds.

TRADITION, among ecclesiastical writers, denotes certain regulations regarding the rites, ceremonies, &c. of religion, which we suppose to have been handed down from the days of the apostles, to the present time.

Tradition is distinguished into written, whereof there are some traces in the writings of the antient fathers; and unwritten, whereof no mention is made in the writers of the first ages of christianity.

TRAER-

TRAERBACH, a town of Germany, situated on the Moselle, twenty miles north-east of Triers.

TRAFFIC. See the articles **TRADE** and **COMMERCE**.

TRAGACANTH, *tragacantha*, in botany, a genus of the diadelphia-decandria class of plants, with a papillose flower; its fruit is a short bilocular pod, of a roundish figure, and containing a few kidney-shaped seeds.

Gum-tragacanth, or, as some call it, gum-adragant, or gum-dragon, is the produce of this shrub, which grows to about four feet high, and has a firm and robust stem, with numerous branches. The gum is brought to us in long and slender pieces, of a flattened figure, more or less, and these not strait, or rarely so; but commonly twisted and contorted various ways, so as to resemble worms. We sometimes meet with it like the other vegetable exsudations, in roundish drops, but these are much more rare. It is moderately heavy, of a firm consistence, and, properly speaking, very tough rather than hard, and is extremely difficult to powder, unless first carefully dried, and the mortar and pestle kept warm. Its natural colour is a pale whitish, and in the cleanest pieces it is something transparent. It is often, however, met with tinged brownish, and of other colours, and more opaque. It has no smell, and very little taste, but what it has is disagreeable. Taken into the mouth, it does not grow clammy, and stick to the teeth, as the gum-arabic does, but melts into a kind of very soft mucilage. It dissolves in water but slowly, and communicates its mucilaginous quality to a great quantity of that fluid. It is by no means soluble in oily or spirituous liquors, nor is it inflammable. It is brought to us from the island of Crete, and from several parts of Asia. It is to be chosen in long twisted pieces, of a whitish colour, very clear, and free from all other colours; the brown, and particularly the black, are wholly to be rejected.

Tragacanth has the same virtues with gum-arabic, but in a greater degree. It greatly inspissates and obtunds the acrimony of the humours, and is therefore found of vast service in inveterate coughs, and other disorders of the breast, arising from an acrid phlegm, and in stranguries, heat of urine, and all other complaints of that kind. It is usually given in the compound powder, called the species diatra-

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gacanthi frigidæ, rarely alone. It is also, by some, esteemed a very great external remedy for wounds, and in this sense made an ingredient in some sympathetic powders, with vitriol and other things. It is by some recommended alone, in form of a powder or strong mucilage, for cracks and chaps in the nipples of women: but it is found, by experience, to be a very troublesome application in those cases, and to do more harm than good, as it dries by the heat of the part, and draws the lips of the wound farther asunder than before.

TRAGEA, in pharmacy, an aromatic powder, grossly beaten and mixed with sugar, taken by way of carminative.

TRAGEDY, a dramatic poem, representing some signal action performed by illustrious persons, and which has frequently a fatal issue, or end. See **DRAMA**.

Aristotle, more scientifically, defines tragedy, the imitation of one grave and entire action, of a just length, and which, without the assistance of narration, by raising of terror and compassion, refines and purges our passions. This definition has given the critics some perplexity; and Corneille declares he cannot reconcile Aristotle with himself: the instances Aristotle cites, he thinks, ruin his own definition; he even denies the purging our passions to be the end of tragedy. Our english authors are more favourable to the definition; by the purging our passions, they understand not the extirpating them, but the reducing them to just bounds; for by shewing the miseries that attend a subjection to them, it teaches us to watch them more narrowly; and by seeing the great misfortunes of others, it lessens the sense of our own.

Tragedy, in its original, M. Hedelin observes, was only a hymn sung in honour of Bacchus, by several persons, who, together, made a chorus of music, with dances and instruments. As this was long, and might fatigue the singers, as well as tire the audience, they bethought themselves to divide the singing of the chorus into several parts, and to have certain recitations in the intervals. Accordingly Thespis first introduced a person upon the stage with this view. Æschylus, finding one person insufficient, introduced a second, to entertain the audience more agreeably, by a kind of dialogue: he also clothed his persons more decently, and first put on them the buskin. See **HYMN**, **CHORUS**, **BUSKIN**, &c.

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The persons who made these recitations on the scene, were called actors; so that tragedy was at first without actors. And what they thus rehearsed, being things added to the singing of the chorus, whereof they were no necessary part, were called episodes. See the article EPISODE. Sophocles found that two persons were not enough for the variety of incidents, and accordingly introduced a third: and here the Greeks seem to have stopped; at least, it is very rare that they introduced four speakers in the same scene.

Tragedy and comedy were, at first, confounded with each other, but were afterwards separated; and the poets applied themselves to the cultivating of tragedy, neglecting comedy. See COMEDY.

When tragedy was got into a better form, they changed the measure of its verse, and endeavoured to bring the action within the compass of a day, or of a revolution of the sun. See the article UNITY.

For the several parts of tragedy, see the articles ACT, SCENE, ACTION, FABLE, CHARACTERS, MANNERS, &c.

The English received the first plan of their drama from the French, among whom it had its rise towards the end of Charles V. under the title of chant-royal, which consisted of pieces in verse, composed in honour of the Virgin, or some of the saints, and sung on the stage: they were called by the title of chant-royal, because the subject was given by the king of the year, or the person who had borne away the prize the year preceding.

The humour of these pieces ran wonderfully among the people, insomuch that in a little time there were formed several societies, who began to vie with each other: one of these, to engage the town from the rest, began to intermix various incidents or episodes, which they distributed into acts, scenes, and as many different persons as were necessary for the representation. Their first essay was in the Bourg St. Maur, and their subject the passion of our Saviour. The provost of Paris prohibiting their continuing it, they made application to court; and to render it the more favourable to them, elected themselves into a friary or fraternity, under the title of brothers of the passion: which title has given some occasion to suspect them to have been an order of religious. The king, on seeing and approving some of their pieces, granted them letters of establishment, in 1402; upon which they built a theatre, and for an age and a half

acted none but grave pieces, which they called moralities; till, the people growing weary of them, they began to intermix farces, or interludes, from prophane subjects.

This mixture of farce and religion displeasing many, they were re-established by an arret of parliament, in 1548, on condition of their acting none but proper, lawful, and decent subjects, without intermeddling with any of the mysteries of religion; and thus were the brothers of the passion despoiled of their religious character: upon which they mounted the stage no more in person, but brought up a new set of comedians, who acted under their direction.

Thus was the drama established, and on this foundation arrived in England. In process of time, as it was improved, it became divided into two branches, agreeable to the practice of the antients, and the nature of things, *viz.* into tragedy and comedy, properly so called; and this last again was subdivided into pure comedy and farce. See the articles COMEDY and FARCE.

TRAGI-COMEDY, a dramatic piece partaking of the nature both of tragedy and comedy, the event whereof is not bloody or unhappy, and wherein is admitted a mixture of less serious characters.

The foundation of tragi-comedy is certainly bad; for endeavouring to make us laugh and cry by turns, it endeavours at contrary motions, which the heart can never undergo; every thing that displeases for the one, indisposes for the other: for which reason it is at present, with great justice, disused. However, tragi-comedy is the only way wherein comedy is allowed to introduce kings and heroes.

TRAGIA, in botany, a genus of the monoeceia-tetrandria class of plants, without any flower petals; its fruit is a very large tricoccus capsule, of a roundish figure, containing single and roundish seeds.

TRAGOPOGON, GOAT'S BEARD, in botany, a genus of the syngenesia polygamia class of plants, the compound flower of which is imbricated and uniform, being composed of a multitude of ligulated semi-floscules, quinque-dentated at the ends, and standing on the embryo-seeds, which are enveloped in a covering, and winged with down.

TRAGUS, *tragos*, in anatomy, one of the protuberances of the auricle, or external ear, called also *hincas*, because usually

usually hairy. The tragus is that protuberance next the temple: that on the opposite side, to which the soft lobe of the ear is annexed, is called the anti-tragus. See the article EAR.

TRAJAN COLUMN, a famous historical column erected in Rome, in honour of the emperor Trajan. It is of the tuscan order, though something irregular; its height is eight diameters, and its pedestal corinthian: it was built in a large square there, called Forum Romanum. Its base consists of twelve stones, of an enormous size, and it is raised on a socle, or foot of eight steps; within side is a stair-case, illuminated with forty-four windows. It is 140 feet high, which is thirty-five short of the antonine column, but the workmanship of the former is much more valued. It is adorned from top to bottom with basso relievo's, representing the great actions of that emperor against the Dacæ.

TRAJECTORY of a comet, is its path or orbit, or the line it describes in its motion. See the article COMET.

TRAIL-BOARD, in a ship, a carved board on each side of her beak, which reaches from the main stem to the figure, or the brackets.

TRAIN, the attendance of a great person, or the trail of a gown, or robe of state. In falconry, it denotes the tail of an hawk.

TRAIN, is likewise used for the number of beats which a watch makes in an hour, or any other certain time.

TRAIN, is also used for a line of gun-powder, laid to give fire to a quantity thereof, in order to do execution by blowing up earth, works, buildings, &c.

TRAIN, or **TRAIL OF ARTILLERY**, includes the great guns, and other pieces of ordnance belonging to an army in the field. See the article CANNON.

TRAIN-OIL, the oil procured from the blubber of a whale by boiling. See the articles OIL and WHALE.

TRAIN-BANDS, or **TRAINED-BANDS**, a name given to the militia of England. See the article MILITIA.

TRAINING, or **TRACING**, in mineralogy, a term used by the miners, to express the tracing up the mineral appearances on the surface of the earth to their head, or original place, and there finding a mine of the metal they contain. See MINE.

TRAITOR, or **TRAYTOR**, a person guilty of treason. See TREASON.

TRALOS MONTES, a province of Portugal; bounded by Spain on the north-east;

by the province of Beira on the south; and by Entreminho Douro on the west.

TRAMBLING of tin ore, among miners, the washing it very clean, which is done in a shovel, and in a frame of boards. See the article TIN.

TRAMEL, an instrument, or device, sometimes of leather, more usually of rope, fitted to a horse's legs, to regulate his motions, and form him to an amble. It is also taken in many places for an iron moveable instrument in chimnies to hang pots over the fire.

TRAMEL-NET, is a long net wherewith to take fowl by night in champain countries, much like the net used for the low bell, both in shape, bigness, and meshes. To use it, they spread it on the ground, so as the nether or farther end fitted with small plumbets, may lie loose thereon; then the other part being borne up by men placed at the fore ends, it is thus trailed along the ground. At each side are carried great blazing lights, by which the birds are raised, and as they rise under the net they are taken.

TRAMONTANE, or **TRAMONTAN**, something beyond, or on the farther side the mountains, applied particularly by the Italians, to such as live on the other side the Alps, i. e. all out of Italy, as the Germans, Flemish, French, &c.

TRANGLE, in heraldry, the diminutive of a fess, commonly called a bar. See the article FESS and BAR.

TRANI, a port-town of Italy, in the kingdom of Naples, and territory of Barri, situated on the gulph of Venice, twenty miles west of Barri.

TRANSACTION, *transactio*, in the civil law, an accommodation of some business, or dispute between two parties, by a mutual and voluntary agreement between them. See ACCOMMODATION.

Philosophical TRANSACTIONS, a kind of journal of the principal things that come before the Royal Society of London. See the article SOCIETY.

It appears, that the printing of these transactions was always, from time to time, the single act of the respective secretaries of the society, till the publication of the 27th volume, in 1753, notwithstanding it has been the common opinion, that they were published by the authority and under the direction of the society itself. The truth is, that the society, as a body, never did interest themselves further in their publication, than by occasionally recommending the

revival of them to some of their secretaries, when, from the particular circumstances of their affairs, the transactions had happened for any length of time to be intermitted, and this seems principally to have been done with a view to satisfy the public, that their usual meetings were then continued for the improvement of knowledge and benefit of mankind, the great ends of their first institution; but the society being of late years greatly enlarged, and their communications more numerous, they thought it advisable, that a committee of their members should be appointed to re-consider the papers read before them, and select out of them such as they should judge proper for publication in the future transactions, which was accordingly done upon the 26th of March, 1752.

TRANSCENDENTAL, or **TRANSCENDANT**, something elevated, or raised above other things; which passes and transcends the nature of other inferior things.

Transcendental quantities, among geometers, are indeterminate ones, or such as cannot be fixed or expressed by any constant equation; such are all transcendental curves, which cannot be defined by any algebraic equation; or which, when expressed by an equation, one of the terms thereof is a variable quantity. Now whereas algebraists use to assume some general letters or numbers, for the quantity sought in these transcendental problems, Mr. Leibnitz assumes general or indefinite equations for the lines sought; *e. gr.* putting x and y for the absciss and ordinate, the equation he uses for a line sought is $a + bx + cy + exy + fxx + gyy \&c. = a$, by the help of which indefinite equation, he seeks the tangent; and by comparing the result with the given property of tangents, he finds the value of the assumed letters $a, b, c, d, \&c.$ and thus defines the equation of the line sought.

If the comparison above-mentioned, do not proceed, he pronounces the line sought not to be an algebraical, but a transcendental one. This supposed, he goes on to find the species of transcendency; for some transcendentals depend on the general division or section of a ratio, or upon the logarithms; others, upon the arcs of a circle; and others, on more intricate and compound enquiries. He therefore, besides the symbols x and y , assumes a third, as v , which denotes the

transcendental quantity; and of these three, forms a general equation for the line sought, from which he finds the tangent, according to the differential method, which succeeds even in transcendental quantities. The result he compares with the given properties of the tangent, and so discovers, not only the values of $a, b, c, d, \&c.$ but also the particular nature of the transcendental quantity. And though it may sometimes happen, that the several transcendentals are so to be made use of, and those of different natures too, one from another; also, though there be transcendents of transcendentials, and a progression of these in infinitum: yet we may be satisfied with the most easy and useful one; and for the most part, may have recourse to some peculiar artifices for shortening the calculus, and reducing the problem to as simple terms as may be.

This method being applied to the business of quadratures, or to the invention of quadratics, in which the property of the tangent is always given, it is manifest, not only how it may be discovered, whether the indefinite quadrature may be algebraically impossible; but also, how, when this impossibility is discovered, a transcendental quadratrix may be found, which is a thing not before shewn. So that it seems, that geometry, by this method, is carried infinitely beyond the bounds to which Vieta and Des Cartes brought it; since, by this means, a certain and general analysis is established, which extends to all problems of no certain degree, and consequently not comprehended within algebraical equations.

Again, in order to manage transcendental problems, wherever the business of tangents or quadratures occurs, by a calculus, there is hardly any that can be imagined shorter, more advantageous, or more universal, than the differential calculus, or analysis of indivisibles and infinites. By this method, we may explain the nature of transcendental lines, by an equation; *e. gr.* let a be the arch of a circle, and x the versed sine; then will

$$a = \frac{Sdx}{\sqrt{2x-xx}}; \text{ and if the ordinate of}$$

the cycloid be y , then will $y = \sqrt{2x-xx}$

$$xx + \frac{Sdx}{\sqrt{2x-xx}}; \text{ which equation per-}$$

fectly expresses the relation between the ordinate y and the absciss x , and from all

all the properties of the cycloid may be demonstrated.

Thus is the analytical calculus extended to those lines, which have hitherto been excluded; for no other reason, but that they were thought incapable of it.

TRANSCOLATION, in pharmacy, the same with filtration, or percolation. See the article **FILTRATION**.

TRANSCRIPT, a copy of any original writing, particularly that of an act, or instrument, inserted in the body of another.

TRANSFER, in commerce, &c. an act whereby a person surrenders his right, interest, or property in any thing moveable or immoveable to another.

The term transfer, is chiefly used for the assigning and making over shares in the stocks, or public funds, to such as purchase them of the proprietors.

TRANSFORMATION, in general, denotes a change of form, or the assuming a new form different from a former one. The chemists have been for a long time seeking the transformation of metals; that is, their transmutation, or the manner of changing them into gold. See the article **TRANSMUTATION**.

TRANSFORMATION of equations. The doctrine of the transformation of equations, and of exterminating their intermediate terms, is thus taught by Mr. Mac Laurin. The affirmative roots of an equation are changed into negative roots of the same value, and the negative roots into affirmative, by only changing the signs of the terms alternately, beginning with the second. Thus, the roots of the equation $x^4 - x^3 - 19x^2 + 49x - 30 = 0$ are $+1, +2, +3, -5$; whereas the roots of the same equation having only the signs of the second and fourth terms changed, *viz.* $x^4 + x^3 - 19x^2 - 49x - 30 = 0$, are $-1, -2, -3, +5$.

To understand the reason of this rule, let us assume an equation, as $x - a \times x - b \times x - c \times x - d \times x - e$, &c. $= 0$, whose roots are $+a, +b, +c, +d, +e$, &c. and another having its roots of the same value, but affected with contrary signs, as $x + a \times x + b \times x + c \times x + d \times x + e$, &c. $= 0$. It is plain, that the terms taken alternately, beginning from the first, are the same in both equations, and have the same sign, being products of an even number of the roots; the product of any two roots having the

same sign as their product when both their signs are changed; as $+a \times -b = -a \times +b$.

But the second terms and all taken alternately from them, because their coefficients involve always the products of an odd number of the roots, will have contrary signs in the two equations. For example, the product of four, *viz.* $abcd$, having the same sign in both, and one equation in the fifth term having $abcd \times +e$, and the other $abcd \times -e$, it follows, that their product $abcde$ must have contrary signs in the two equations: These two equations, therefore, that have the same roots, but with contrary signs, have nothing different but the signs of the alternate terms, beginning with the second. From which it follows, that if any equation is given, and you change the signs of the alternate terms, beginning with the second, the new equation will have roots of the same value, but with contrary signs. See **EQUATION**.

It is often very useful to transform an equation into another that shall have its roots greater or less than the roots of the proposed equation by some given difference.

Let the equation proposed be the cubic $x^3 - px^2 + qx - r = 0$. And let it be required to transform it into another equation, whose roots shall be less than the roots of this equation by the given difference (e); that is, suppose $y = x - e$, and, consequently, $x = y + e$; then, instead of x , and its powers, substitute $y + e$, and its powers, there will arise this new equation:

$$(A) \left. \begin{aligned} y^3 + 3ey^2 + 3e^2y + e^3 \\ - py^2 - 2pey - pe^2 \\ + qy + qe \\ - r \end{aligned} \right\} = 0$$

whose roots are less than the roots of the preceding equation by the difference (e). If it had been required to find an equation whose roots should be greater than those of the proposed equation by the quantity (e), then we must have supposed $y = x + e$, and, consequently, $x = y - e$, and then the other equation would have had this form:

$$(B) \left. \begin{aligned} y^3 - 3ey^2 + 3e^2y - e^3 \\ - py^2 + 2pey - pe^2 \\ + qy - qe \\ - r \end{aligned} \right\} = 0$$

If the proposed equation be in this form, $x^3 + px^2 + qx + r = 0$, then, by supposing $x + e = y$, there will arise an equation agreeing, in all respects, with the equation

equation (A), but that the second and fourth terms will have contrary signs.

And by supposing $x - e = y$, there will arise an equation agreeing with (B), in all respects; but that the second and fourth terms will have contrary signs to what they have in (B).

The first of these suppositions gives this equation,

$$(C) \left. \begin{array}{l} y^3 - 3ey^2 + 3e^2y - e^3 \\ + py^2 - 2pey + pe^2 \\ + qy - qe \\ + r \end{array} \right\} = 0$$

The second supposition gives the equation,

$$(D) \left. \begin{array}{l} y^3 + 3ey^2 + 3e^2y + e^3 \\ + py^2 + 2pey + pe^2 \\ + qy + qe \\ + r \end{array} \right\} = 0$$

The first use of this transformation of equations is to shew how the second (or other intermediate) term may be taken away out of an equation.

It is plain, that in the equation (A), whose second term is $3e - p \times y^2$, if you suppose $e = \frac{1}{3}p$, and consequently, $3e - p = 0$, then the second term will vanish.

In the equation (C), whose second term is $-3e + p \times y^2$, supposing $e = \frac{1}{3}p$, the second term also vanishes.

Now the equation (A) was deduced from $x^3 - px^2 + qx - r = 0$, by supposing $y = x - e$: and the equation (C) was deduced from $x^3 + px^2 + qx + r = 0$, by supposing $y = x + e$. From which this rule may easily be deduced for exterminating the second term out of any cubic equation.

Rule. Add to the unknown quantity of the given equation the third part of the coefficient of the second term, with its proper sign, viz. $\mp \frac{1}{3}p$, and suppose this aggregate equal to a new unknown quantity (y). From this value of y , find a value of x by transposition, and substitute this value of x , and its powers, in the given equation, and there will arise a new equation that shall want the second term.

Example. Let it be required to exterminate the second term out of this equation, $x^3 - 9x^2 + 26x - 34 = 0$, suppose $x - 3 = y$, or $y + 3 = x$; and substituting according to the rule, you will find

$$\left. \begin{array}{l} y^3 + 9y^2 + 27y + 27 \\ - 9y^2 - 54y - 81 \\ + 26y + 78 \\ - 34 \end{array} \right\} = 0$$

$$y^3 - 10y - 10 = 0$$

In which there is no term where y is of two dimensions, and an asterisk is placed in the room of the second term, to shew it is wanting.

Let the equation proposed be of any number of dimensions represented by (n), and let the coefficient of the second term with its sign prefixed, be $-p$; then sup-

posing $x - \frac{p}{n} = y$, and, consequen-

ly, $x = y + \frac{p}{n}$, and, substituting this v-

alue for x in the given equation, there will arise a new equation that shall want the second term.

It is plain, that the sum of the roots of the proposed equation is $+p$; and sin-

ce we suppose $y = x - \frac{p}{n}$, it follows, th-

in the new equation, each value of y will be less than the respective value of x .

$\frac{p}{n}$; and since the number of the roots

is n , it follows, that the sum of the values of y will be less than $+p$, the sum

of the values of x , by $n \times \frac{p}{n}$, the difference

of any two roots; that is, by $+p$ and therefore, the sum of the values of y will

be $+p - p = 0$.

But the coefficient of the second term of the equation of y is the sum of the values of y , viz. $+p - p$, and, therefore, the coefficient is equal to nothing; and, consequently, in the equation of y , the second term vanishes. It follows then, that the second term may be exterminated out of any given equation by the following

Rule. Divide the coefficient of the second term of the proposed equation by the number of dimensions of the equation; and assuming a new unknown quantity y , add to it the quotient, having its sign changed. Then suppose this aggregate equal to x , the unknown quantity in the proposed equation; and for x and its powers, substitute the aggregate and its powers, so shall the new equation, that arises, want its second term.

If the proposed equation is a quadratic as $x^2 - px + q = 0$, then, according to the rule, suppose $y + \frac{1}{2}p = x$, and, substituting this value for x , you will find

$$\left. \begin{array}{l} y^2 + py + \frac{1}{4}p^2 \\ - py - \frac{1}{2}p^2 \\ + q \end{array} \right\} = 0$$

$$y^2 - \frac{1}{4}p^2 + q = 0$$

And from this example, the use of exterminating the second term appears: for, commonly, the solution of the equation, that wants the second term, is more easy. And, if you can find the value of y from this new equation, it is easy to find the value of x by means of the equation $y + \frac{1}{2}p = x$. For example, Since $y^2 + q - \frac{1}{4}p^2 = 0$, it follows, that $y^2 = \frac{1}{4}p^2 - q$, and $y = \pm \sqrt{\frac{1}{4}p^2 - q}$, so that $x = y + \frac{1}{2}p = \frac{1}{2}p \pm \sqrt{\frac{1}{4}p^2 - q}$.

If the proposed equation is a biquadratic, as $x^4 - px^3 + qx^2 - rx + s = 0$, then by supposing $x - \frac{1}{4}p = y$, or $x = y + \frac{1}{4}p$, an equation shall arise having no second term. And if the proposed is of five dimensions, then you must suppose $x = y \pm \frac{1}{5}p$. And so on.

When the second term in any equation is wanting, it follows, that the equation has both affirmative and negative roots, and that the sum of the affirmative roots is equal to the sum of the negative roots: by which means, the coefficient of the second term, which is the sum of all the roots of both sorts, vanishes, and makes the second term vanish.

In general, the coefficient of the second term is the difference between the sum of the affirmative roots and the sum of the negative roots: and the operations we have given serve only to diminish all the roots, when the sum of the affirmative is greatest, or increase the roots when the sum of the negative is greatest, so as to balance them, and reduce them to an equality.

It is obvious, that, in a quadratic equation that wants a second term, there must be one root affirmative, and one negative; and these must be equal to one another.

In a cubic equation that wants the second term, there must be either two affirmative roots equal, taken together, to a third root that must be negative; or, two negative equal to a third that must be positive.

Let an equation $x^3 - px^2 + qx - r = 0$ be proposed, and let it be now required to exterminate the third term.

By supposing $y = x - e$, the coefficient of the third term in the equation of y is found (see equation A) to be $3e^2 - 2pe + q$. Suppose that coefficient equal to nothing, and by resolving the quadratic equation $3e^2 - 2pe + q = 0$, you will find the value of e , which, substituted for it in the equation $y = x - e$, will

show how to transform the proposed equation into one that shall want the third term.

The quadratic $3e^2 - 2pe + q = 0$ gives

$$e = \frac{p \pm \sqrt{p^2 - 3q}}{3}$$

So that the proposed cubic will be transformed into an equation wanting the 3d term, by supposing $y = x - \frac{p - \sqrt{p^2 - 3q}}{3}$

$$\text{or } y = x - \frac{p + \sqrt{p^2 - 3q}}{3}$$

If the proposed equation is of n dimensions, the value of e , by which the third term may be taken away, is had by resolving the quadratic equation

$$e^2 + \frac{2p}{n} \times e + \frac{2q}{n \times n - 1} = 0, \text{ supposing}$$

$-p$ and $+q$ to be the coefficients of the second and third terms of the proposed equation.

The fourth term of any equation may be taken away by solving a cubic equation, which is the coefficient of the fourth term in the equation when transformed. The fifth term may be taken away by solving a biquadratic; and, after the same manner, the other terms can be exterminated, if there are any.

TRANSFUSION, *transfusio*, the act of pouring a liquor out of one vessel into another.

TRANSFUSION of the blood, in surgery, the conveying the arterial blood of one man or animal, into the veins of another. See the article **INJECTION**.

Notwithstanding injections and transfusions are seldom practised by our modern surgeons, they were highly celebrated, and often performed in the last century. The generality of physicians, not without reason, attribute most disorders of the body to some vice in the blood, and therefore, some were led to think, that no method could be more ready to remove and correct that vice, than injecting a proper medicine in the veins to mix with the blood itself, or the transfusing the sound blood of one animal into the veins of another, instead of that which is diseased. But notwithstanding the vast expectations which had been formed by physicians from this operation, frequently the event turned out worse than the disease; for we are told, that almost all the patients who have been treated this way,

way; degenerated into a stupidity, foolishness, or a raving, or melancholy madness, or have been taken off with a sudden death, either in, or not long after, the operations.

For the transfusion of blood into the veins, first, a vein is to be opened in the patient's arm, or hand, and then a small tube of silver, brass or ivory, thrust upward into it: the same is to be done with the sound person, only the tube must here be inserted downward, towards the small end of the vein; this done, the smallest of the tubes is to be inserted into the other larger one, by which means, as much blood will pass from the sound person into the patient, as may be thought proper, and then the incised veins are to be dressed, or bound up, as in bleeding: if the patient does not recover after one transfusion, the operation should be repeated again, at convenient intervals; but before the patient receives the blood of the sound person, he ought to be bled proportionably, that the new blood last received, may have the freer circulation. Sometimes a vein is opened in each arm of the patient at the same time, that as much of the vitiated blood may flow out of one orifice as he receives of the sound by the other. If the blood is to be transfused out of some animal into the patient, then a calf or a lamb, for example, is to be secured by ligatures, and one of their veins or arteries opened in the neck, leg, or thigh, and the rest of the operation managed as before.

TRANSGRESSION, *transgressio*, an offence against some law, or a breach or violation thereof.

TRANSGRESSIONE, in our law, is a writ usually called a writ or action of trespass.

TRANSILVANIA, a principality bounded by the Carpathian mountains, which divide it from Poland on the north; by Moldavia on the east; by Walachia, and part of Hungary, on the south; and by another part of Hungary on the north; being about 120 miles long, and almost as many broad, and lying between 22 and 25 degrees east long. and between 45 and 48° of north lat.

TRANSIT, *transitus*, in astronomy, signifies the passage of any planet, just by, or over a fixed star, or the sun, and of the moon in particular, covering or moving over any planet.

TRANSITION, in music, is when a greater note is broken into a less, to soften the

roughness of a leap by a gradual passage to the next note following; whence it is commonly called the breaking of a note. See NOTE and PASSAGE.

TRANSITION, in rhetoric, is of two sorts. The first is when a speech is introduced abruptly without express notice given of it; as when Milton gives an account of our first ancestors evening devotions.

Both turn'd, and under open sky
ador'd

The God that made both air, sky, earth
and heaven.—

— Thou also mad'st the night,

Maker omnipotent, and thou the day!

The second sort of transition is, when a writer suddenly leaves the subject he is upon, and passes unto another, from which it seems different at first view, but has a relation and connection with it, and serves to illustrate and enlarge it.

TRANSITIVE, in grammar, an epithet applied to such verbs as signify an action which passes from the subject that does it, to or upon another subject which receives it. Under the head of verbs transitive, come what we usually call verbs active and passive; other verbs, whose action does not pass out of themselves, are called neuters, and by some grammarians, intransitives.

TRANSITORY, in common law, stands in opposition to local; thus actions are said to be transitory, which may be laid in any county or place. See LOCAL.

TRANSLATION, the act of transferring or removing a thing from one place to another; we say the translation of a bishop's see, a council, a seat of justice, &c.

TRANSLATION is also used for the version of a book, or writing out of one language into another.

TRANSMARINE, something that comes from, or belongs to, the parts beyond sea.

TRANSMIGRATION, the removal or translation of a whole people into another country, by the power of a conqueror.

TRANSMIGRATION, is particularly used for the passage of a soul out of one body into another, being the same with what we otherwise call metempsychosis. See the article METEMPSYCHOSIS.

TRANSMISSION, in optics, &c. the act of a transparent body passing the rays of light through its substance, or suffering them to pass; in which sense the word stands opposed to reflection. Transmission is also frequently used in the same sense with refraction, by which most bodies,

bodies, in transmitting the rays, do also refract them. For the cause of transmission, or the reason why some bodies transmit, and others reflect the rays, see **OPACITY** and **TRANSPARENCY**.

The rays of light, Sir Isaac Newton observes, are subject to fits of easy transmission and reflection. See **LIGHT**.

TRANSMUTATION, the act of transforming, or changing one nature into another. Nature, Sir Isaac Newton observes, seems delighted with transmutations: he goes on to enumerate several kinds of natural transmutations; gross bodies, and light, he suspects, may be mutually transmuted into each other; and adds, that all bodies receive their active force from the particles of light, which enter their composition. For all fixed bodies, when well heated, emit light as long as they continue so; and again, light intermingles itself, and inheres in bodies, as often as its rays fall on the solid particles of those bodies. Again, water, which is a fluid, volatile, tasteless salt, is by heat, transmuted into a vapour, which is a kind of air, and by cold, into ice, which is a cold transparent brittle stone, easily dissolvable, and this stone is convertible again into water by heat, as vapour is by cold. See **WATER**, **VAPOUR**, **ICE**, &c.

Earth, by heat, becomes fire; and by cold, is converted into earth again; dense bodies, by fermentation, are rarified into various kinds of air; and that air, by fermentation also, and sometimes without, reverts into gross bodies. Quick-silver sometimes puts on the form of a fluid metal, sometimes it appears in shape of a pellucid fragile salt, called sublimate; sometimes of a pellucid volatile white tasteless earth, called mercurius dulcis; by distillation it becomes vapour, and by agitation in vacuo, it shines like fire, &c. See **EARTH**, **MERCURY**, &c. All bodies, beasts, fishes, insects, plants, &c. with all their various parts, grow and increase out of water, and aqueous and saline tinctures; and by putrefaction, all of them revert into water or an aqueous liquor again. Farther, water exposed a while to the open air, puts on a tincture, which, in process of time, has a sediment and a spirit, and before putrefaction, yields nourishment both for animals and vegetables.

TRANSMUTATION, in alchemy, denotes the art of changing or exalting imperfect metals into gold or silver. This is

also called the grand operation, and, they say, is to be effected with the philosopher's stone. See the article **PHILOSOPHER'S STONE**.

Some alchemists hold, that the transmutation should rather be called the perfection of imperfect metals; as holding all metals intended by nature, to arrive equally at the perfection of gold, in as much as they are composed of the same matter; and that it is only the impurity of their matrices, that is, of the place wherein they are formed by nature, that has prevented their arriving thereat. The elixir being projected on any of these metals, it is supposed to purge and separate the impure parts from the pure, and to join itself wholly to the mercury (which is the purest part) as being of the same nature.

Whether or no metals may be transmuted into one another, is a point strongly disputed among philosophers; the alchemists strenuously asserting the affirmative. Some metals, it is commonly supposed, may be changed into others, e.g. iron into copper, and lead into tin; but Cardan, and some others, deny even this, and argue farther, that though iron and brass, as being nearly alike in weight and tenacity, &c. provided their colour and hardness could be changed, might be converted into one another, either really or at least apparently; yet would the transmuting or ripening of other metals into gold or silver, be still not less impossible; both as these metals are all to be first calcined, after which they can never again be brought back to their pristine purity, and as there is a generation required which is not the work of art but of nature. Cardan, L'ermery, Dickenson, and others, give us accounts of the various impostures of adepts in the business of transmutation; some, for instance, fixing mercury with verdigrease, and then heightening the colour with cadmia, &c. but this, if tried with the coppel, all goes off in fumes; and, in effect, nothing produced this way ought to be adjudged true gold, unless it endure copelling and cementation, purification with antimony, and the depart. Add, that it must have the malleability, extreme ductility, and specific gravity of gold. See **GOLD**, &c.

TRANSMUTATION, in geometry, denotes the reduction or change of one figure or body into another of the same area or solidity, but of a different form;

as a triangle into a square, a pyramid into a parallelopiped, &c. In the higher geometry, transmutation is used for the converting a figure into another of the same kind and order, whose respective parts rise to the same dimensions in an equation, admit of the same tangents, &c. If a rectilinear figure be transmuted into another, it is sufficient that the intersections of the lines which compose it be transferred, and the lines drawn through the same in the new figure. If the figure to be transmuted be curvilinear, the points, tangents, and other right lines by means whereof the curve line is to be defined, must be transferred.

TRANSOM, among builders, denotes the piece that is framed across a double light window. See the article **WINDOW**.

TRANSOM, among mathematicians, signifies the vane of a cross-staff, or a wooden number fixed across, with a square whereon it slides, &c. See **CROSS-STAFF**.

TRANSOM, in a ship, a piece of timber which lies athwart the stern, between the two fashion-pieces, directly under the gun-room-port. See the article **SHIP**.

TRANSPARENCY, *diaphaneity*, in physics, a quality in certain bodies whereby they give passage to the rays of light, in contradistinction to opacity, or that quality of bodies which renders them impervious to the rays of light. For the doctrine of transparency, see **OPACITY**.

TRANSPIRATION, the insensible, or almost insensible, passage of an excrementitious matter through the pores of the skin, called also perspiration. See the article **PERSPIRATION**.

TRANSPIRATION is also used by some authors for the ingress or entrance of the air, vapour, &c. through the pores of the skin into the body. Cardan, by this kind of transpiration, accounts for the prodigy of a woman whose daily urine weighed twenty-seven pounds, though all the food she took, both dry and liquid, did not exceed four pounds. Dr. Baynard also suspects some such transpiration to be the case in hydropical persons.

TRANSPLANTATION, in agriculture and gardening, the act of removing trees or plants from the places where they were sowed, or raised, and planting them in others. See the article **PLANTING**.

TRANSPLANTATION, in natural magic, is used for a method of curing diseases, by transferring them from one subject to another, which was much in vogue

among certain chemical or rather sympathetic physicians some years ago. A subject too whimsical to deserve further notice.

TRANSPORTATION, the act of conveying or carrying a thing from one place to another.

Transportation is a kind of punishment, or more properly an alleviation or commutation of punishment, for criminals convicted of felony, who for the first offence, unless it be an extraordinary one, are generally transported to the plantations, there to bear hard labour for a term of years; within which, if they return, they are executed without farther trial.

TRANSPORTATION of plants. In sending plants from one country to another, great cautions are necessary. The plants sent from a hotter country to a colder, should be always put on board in the spring of the year, that the heat of the season may be advancing as they approach the colder climates; and, on the contrary, those which are sent from a colder country to a hotter, should be sent in the beginning of winter. The best way of packing up plants for a voyage, if they be such as will not bear keeping out of the earth, is to have boxes with handles, filling them with earth, and planting the roots as close together as may be; the plants should be set in these boxes three weeks before they are to be put on board; and in good weather they should be set upon the deck; and in bad removed or covered with a tarpaulin. If they are going from a hotter country to a colder one, they must have very little moisture; if, on the contrary, they are going from a colder to a warmer, they may be allowed water more largely, and being shaded from the heat of the sun, they will come safe.

A great many plants, however, will live out of the earth a considerable while; as the sedums, euphorbiums, ficoides, and other succulent ones. These need no other care than the packing them up with moss in a close box; and there should be a little hay put between them, to prevent them from wounding or bruising one another, and holes bored in the boxes to keep them from heating and putrefying. In this manner they will come safe from a voyage of two or three, or even four or five months. Several trees also will come safe in the same manner; taking them up at a season when they have done growing, and packing them up with moss. Of this

fort are oranges, olives, capers, jasmynes, and pomegranate-trees. These, and many others, are annually brought over to us from Italy; and, though they are three or four months in the passage, seldom miscarry. The best way of sending over seeds, is in their natural husks, in a bag, or packed up in a gourd-shell, keeping them dry, and out of the way of vermin.

TRANSPPOSITION, in algebra, the bringing any term of an equation over to the other side. See **EQUATION**.

TRANSPPOSITION, in grammar, a disturbing or dislocating of the words in a discourse, or a changing of their natural order of construction, to please the ear by rendering the contexture more easy, smooth, and harmonious. A transposition which renders the sense perplexed, is vicious. The constitution of the antient languages, being much more artful than that of the modern ones, allowed of much greater and more frequent transpositions. The English, French, &c. scarce ever allowed of them but in oratory, and poetry, in which cases they serve to give a force and energy to the discourse or the verse, and to prevent their languishing.

TRANSPPOSITION, in music, is a changing of the notes of a piece of music, or the shifting a song from its former situation, to set it either higher or lower, or in another octave.

Of this there are two kinds, the first is with respect to the clef, the second with respect to the key. Transposition, with respect to the clef, consists in the changing the places or seats of the notes or letters among the lines and spaces, but so as that every note is set at the same letter. This is done either by removing the same clef to another line, or by using another clef, but with the same signature, by reason the piece is in the same key. See the article **CLEF**.

The practice is easy in either case. In the first you take the first note at the same distance, either above or below the clef-note, in its new position, as before, and all the rest of the notes in the same relations or distances from one another, so that the notes are all set on lines and spaces of the same name. In the second, or setting of the music to a different clef, it is to be observed the places of the three clef-notes are invariable in the scale, and are to one another in these relations, the mean fifth above the bass, and the treble a fifth above the mean. Now to trans-

pose a new clef, for example, from the treble to the mean, wherever the new clef is set, we suppose it the same individual note in the same place of the scale, as if the piece were that part in the composition to which the new clef is generally appropriated, so that it may direct to the same notes we had before transposition. Now from the fixed relations of the three clefs in the scale, it will be easy to find the seat of the first transposed note, and then all the rest are to be set at the same mutual distances they were at before. See the article **SCALE**.

Suppose, for example, the first note of a song be *d*, a sixth above the bass clef; wherever that clef is placed, the first note must be a greater second above it; because a greater second above the mean, is a greater sixth above the bass clef, the relation between the two being a fifth: so that the first note will still be the same individual note *d*. The use of this transposition is, that if a song be set with a certain clef in a certain position, the notes go far above or below the system of five lines, they may, by the change of the place of the same clef in the particular system, or by taking a new clef, be brought more within the compass of the lines.

Transposition from one key to another, is the changing of the key, or a setting all the notes of a song at different letters, and performing it consequently in different places upon the instrument. See the article **KEY**.

The design hereof is, that a song which being begun in one place is too high, too low, or otherwise inconvenient for a certain instrument, may be begun in another place, and from that carried on through all its just degrees. The clef and its positions here remain the same, and the change is of the notes themselves, from one letter, and its line or space, to another. In the former transposition the notes were expressed by the same letters, but both removed to different lines and spaces; in this the letters are unmoved, and the notes of the song transferred to or expressed by other letters, and consequently set upon different lines and spaces, which therefore requires a different signature of the clef.

TRANSUBSTANTIATION, *transubstantiatio*, in theology, the conversion or change of the substance of the bread and wine in the eucharist, into the body and blood of Jesus Christ, which the romish

church hold is wrought by the consecration of the priest. This is a main point in the romish religion, and is rejected by the protestants, the former maintaining the transubstantiation to be real, the latter only figurative; interpreting the text *hoc est corpus meum*, "this signifies my body:" but the council of Trent stood up strenuously for the literal sense of the verb *est*, and say expressly, that in transubstantiation the body and blood of our Lord Jesus Christ are truly, really, and substantially under the species of bread and wine. The controversies about this point, are almost innumerable.

TRANSMUPTION, *transumptio*, in the schools, a syllogism by concession or agreement, used where a question proposed is transferred to another; with this condition, that the proof of this latter should be admitted for a proof of the former. See the article **SYLLOGISM**.

TRANSVERSALIS, in anatomy, a name given to several muscles, &c. in respect to their situation, progress, &c. as, 1. The transversalis abdominis, a muscle which lies under the obliqui, and arises from the cartilago xiphoides, from the extremities of the false ribs, from the transverse apophysis of the vertebræ of the loins, is fixed to the inner side of the spine of the ileum, and inserted in the os pubis and the linea alba. This, with the obliqui, unites its tendons as it approaches the linea alba, and is the only muscle that is cut in the operation of the bubonocoele. It has a fine and thin membrane, that closes exactly its ring or hole through which the vessels pass. 2. Transversalis colli, is said to be a part of the longissimus dorsi. It arises from the os sacrum, and from all the transverse processes of the vertebræ of the loins, back and neck, except the two first; and is inserted by so many distinct tendons into all the superior spines. It moves the whole spine obliquely backwards. 3. Transversalis pedis placentini, comes from the bone of the metatarsus that sustains the toe next the little toe, and passing across the other bones, is inserted into the os sesamoides of the toe. Its use is to bring all the toes close to one another. 4. Transversalis penis, one of the dilators of the urethra, arising from the tubercle of the os ischium on each side, and inserted into the posterior part of the bulb of the urethra; however these muscles are not quite determinate and certain in their origin or insertion, and sometimes

they are wholly wanting: when they act, they dilate the urethra in its posterior part. 5. Transversalis is also a name given to a suture of the cranium, because of its traversing or crossing the face from one side to another. See **SKULL**.

TRANSVERSE, something that goes across another, from corner to corner; thus bends and bars, in heraldry, are transverse pieces or bearings: the diagonals of a parallelogram or a square, are transverse lines: lines which make intersections with perpendiculars, are also called oblique or transverse lines.

For the transverse axis or diameter, called also the first and principal axis, see the articles **AXIS**, **DIAMETER**, **LATUS TRANSVERSUM**, **ELLIPSIS**, &c.

TRANSVERSE MUSCLES, in anatomy, are certain muscles arising from the transverse processes of the vertebræ of the loins. See the article **TRANSVERSALIS**.

TRAPA, in botany, a genus of the tetrandria-monogynia class of plants, the corolla whereof consists of four petals, vertically ovated, and larger than the cup: the fruit is a hard osseous capsule, of an oblong oval figure, containing only one cell, and armed with four sharp, thick spines, placed oppositely in the middle of the sides, and pointed; these before were the leaves of the calyx: the seed is a covered single nucleus, of an oval figure.

TRAPANO, a city and port-town of Sicily, situated on the most western parts of the island, in east long. $12^{\circ} 8'$, north lat. 38° .

TRAPEZIUM, in geometry, a plane figure contained under four unequal right lines. 1. Any three sides of a trapezium taken together, are greater than the third. 2. The two diagonals of any trapezium, divide it into four proportional triangles. 3. If two sides of a trapezium be parallel, the rectangle under the aggregate of the parallel sides and one half their distance is equal to that trapezium. 4. If a parallelogram circumscribes a trapezium, so that one of the sides of the parallelogram be parallel to a diagonal of the trapezium, that parallelogram will be the double of the trapezium. 5. If any trapezium has two of its opposite angles, each a right angle, and a diagonal be drawn joining these angles; and if from the other two angles be drawn two perpendiculars to that diagonal, the distances from the feet of these perpendiculars to those right angles, respectively taken, will be equal. 6. If the sides of a trapezium be each bisected,

and the points of bisection be joined by four right lines, these lines will form a parallelogram, which will be one half of the trapezium. 7. If the diagonals of a trapezium be bisected, and a right line joins these points, the aggregate of the squares of the sides is equal to the aggregate of the squares of the diagonals, together with four times of the square of the right line joining the point of bisection. 8. In any trapezium, the aggregate of the diagonals is less than the aggregate of four right lines drawn from any point (except the intersection of the diagonals) within the figure.

TRAPEZIUS, in anatomy. See the article **CUCULARIS**.

TRAPEZOID, is a solid irregular figure, having four sides not parallel to one another.

TRAPEZOND, or **TREBISOND**, a city and port-town of asiatic Turkey, in the province of Amasia, situated on the Black-sea; east long. $42^{\circ} 20'$, north lat. $42^{\circ} 26'$.

TRAVE, a river of Germany, in the circle of Lower Saxony and dutchy of Holstein, which runs from west to east by Lubeck, and falls into the Baltic at Travemund.

TRAVEMUND, a port-town of the dutchy of Holstein, situated on the Baltic-sea, at the mouth of the river Trave; east long. $10^{\circ} 45'$, north lat. $54^{\circ} 30'$.

TRAVERSE, or **TRANSVERSE**, in general, denotes something that goes athwart another; that is, crosses and cuts it obliquely.

Hence, to traverse a piece of ordnance, among gunners, signifies to turn or point it which way one pleases, upon the platform.

In fortification, traverse denotes a trench with a little parapet, or bank of earth, thrown perpendicularly across the moat, or other work, to prevent the enemy's cannon from raking it. These traverses may be from twelve to eighteen feet, in order to be cannon proof, and their height about six or seven feet, or more, if the place be exposed to any eminence. And to preserve a communication, a passage of about five or six feet wide must be left at one end of the traverse. The different ways of constructing these works, are represented in plate CCLXXXI. fig. 2. n^o 1, 2, 3 and 4.

If any part of a work, thus shut in by one or more traverses, is likely to be defended by the musketry, it will be proper

to add to the traverses one or more foot-banks within the defence, for the troops to mount on, when they want to fire over the traverse.

TRAVERSE, in navigation, is a compound course, wherein several different successive courses and distances are known.

To work a traverse, or to reduce a compound course to a single one, 1. Make a table of six columns, marked course, distance, N. S. E. W. beginning at the left-hand, and write the given courses and distances in their proper columns, 2. Seek the given courses and distances in the traverse table, and let the corresponding differences of latitude and departure be wrote in their proper columns in the table made for the question. 3. Add up the columns of northing, southing, easting, and westing; then the difference between the sums of northing and southing, gives the whole difference of latitude, which is of the same name with the greater; and the difference between the sums of easting and westing will be the whole departure, which is likewise of the same name with the greater. 4. The whole diff. lat. and depart. to the compound course being found, the direct course and distance will be found by Case IV. of plain-sailing. See the article **NAVIGATION**.

Example: Suppose a ship, in the latitude of $4^{\circ} 10'$ north lat. $3^{\circ} 39'$ E. long. sails S. 11° W. 91 miles, S. W. 120 miles, W. N. W. 130 miles, S. E. 135 miles, S. E. by E. 130 miles, and S. W. by S. 150 miles; required the direct course and distance sailed, and the latitude and longitude the ship is in?

Geometrically: draw the meridian line $p x$ (plate XL. fig. 5.) and make the angle $q p 2$ equal to $11^{\circ} 15' = 1$ point, and draw the right line $q p$, making it equal to 88 miles, the first distance sailed; and let fall the perpendicular $q 2$; then will q be the place of the ship, $p 2$ the difference of latitude, and $q 2$ the departure belonging to the first course; and after the same manner make the triangles $q 3 r$, $r 5 4$, $4 2 5$, $5 u 6$, and $6 7 w$, be projected; then will w be the place of the ship at the end of her sailing, $p x$ the difference of latitude, $w x$ the departure, the angle $x p w$ her direct course from her first to her last station, and $p w$ her direct distance; which may be all measured by the instructions given under the article **NAVIGATION**.

Arithmetically: the arithmetical solution of

of this problem depends entirely on the first and fourth cases of *Plane SAILING*; for first the corresponding difference of latitude and departure must be found to each course and distance, as in the first case, and placed in a table according to their several directions: that is, when the ship sails to the northward, the difference of latitude must be placed in the north column, but, when to the southward, in the south column; and the departure, if she sails to the westward, in the west column, but, if to the eastward, in the east column. Then will the totals of the several columns shew the northings, southings, eastings, and westings the ship has made. And, consequently, if the southings exceed the northings, the ship will be to the southward of her first station, and just as much as is the excess, and *vice versa*; in like manner, if the eastings exceed the westings, the ship will be to the eastward of her first meridian, but, if the contrary, to the westward. Then we shall have the whole difference of latitude and departure from the meridian given, to find the course and distance, as in the fourth case. See the following table.

Courses.	Distances.	Diff. of lat.		Departure.	
		North-ings.	South-ings.	East-ings.	West-ings.
S. 22° W.	91		89,1		17,2
S. W.	120		84,8		84,8
W. N. W.	130	49,8			120,1
S. E.	135		95,4	95,4	
S. E. by E	130		73,3	108,0	
S. W. by S.	150		124,7		83,4
		49,8	467,5	203,4	305,5
			49,8		203,4
		diff. lat. 417,7		depa. 102,1	

Hence it appears, that the ship is 417,7 miles to the southward of her first station, and 102,1 miles to the westward of her first meridian; whence we may, by the fourth case of plane sailing, find her direct course and distance, as follows:

1. As the difference of latitude $p x = 417,7 = \}$ 2.6208645
 Is to the radius $= 90^\circ 00' = 10.0000000$
 So is the departure $w x = \}$ 2.0090257
 $= 102,1 = - - -$

To the T. of the course or angle $x p p x = 55^\circ 44' = \}$ 9.3881612
 Which is south $55^\circ 44'$ westerly, or some-

thing more than south by west, because the difference of latitude is southerly, and the departure westerly.

2. As the sine of the course $= 13^\circ 44' = - \}$ 9.3760034
 Is to the departure $= 102,1 = 2.0090257$
 So is the radius $= 90^\circ 00' = 10.0000000$

To the distance $= 429,6 = 2.6330223$
 And, because the difference of latitude exceeds the latitude sailed from, d. m.

Therefore, from the difference of lat. $= 417,7 = \}$ 61 57,7

Take the lat. sailed from $= 4 : 10 N.$

Remains the lat. the ship is in $= 2 : 47,7 S.$

And, because the difference of longitude is westerly, therefore, d. m.

From the long. sailed from $= 3 : 39 E.$

Take the difference of longitude $= 102,1 = \}$ 1 : 42,1 W.

Remains the long. the ship is in $= - - - \}$ 1 : 47,9 E.

Hence it appears, that the ship is arrived in the latitude of $2^\circ 47,7' = 2^\circ 47' 42''$ south, and $1^\circ 47,9' = 1^\circ 47' 54''$ east longitude; her direct course from her first to her last station being south, $55^\circ 44'$ westerly, distant 429,6 miles.

TRAVERSE, in law, denotes the denial of some matter of fact alledged to be done in a declaration, or pleadings; upon which the other side coming and maintaining that it was done, issue is joined for the cause to proceed to trial.

TRAVERSE of an indictment, or presentment, is the contradicting or denying some chief point of it, and taking issue thereon.

TRAVERSE of an office, is the proving that an inquisition made by lands or goods, is defective and untruly made.

TRAVERSE is sometimes also used, in heraldry, for a partition of an escutcheon, of figure represented in pl. CCLXXXI. fig. 4. which is blazoned parti per pale traverse, argent and gules.

TRAVESTY, or **TRAVESTI**, a french term, derived from the verb *travestir*, to disguise one's self, or to appear in masquerade: and hence, travesty is applied to the disfiguring of an author, or the translating him into a style and manner different from his own, by which means it becomes difficult to know him.

TRAUMATICS, the same with **vulnery medicines**. See **VULNERARY**.

TRAW, a port-town of Dalmatia, situated on the gulph of Venice, in east long. $17^\circ 20'$, and north lat. $43^\circ 10'$.

TRAYGNERA, a town of Valencia, in Spain.

Spain, near the confines of Catalonia : west long. 15', and north lat. 40° 32'.

TREACLE, *theriaca*, in pharmacy. See the article **THERIACA**.

Some also give the name treacle to mellasses; and in this sense it is that Dr. Shaw, in his Essay on distillery, has endeavoured to bring into use several sorts of treacles, which might be made at home, and would serve very conveniently for the distillation of spirits, or the making of potable liquors. These are the inspissated juices or decoctions of vegetables: such as the sweet juice of the birch, or sycamore, procured by tapping or piercing the trees in spring, and the common wort made from malt, or from other vegetable substances treated in the same manner. These liquors are severally to be boiled down in a copper till they begin to inspissate, and then to be poured into a balneum mariæ, when the remainder of the evaporation may be finished without burning the inspissated juices: thus prepared it may be at any time reduced to the state of wort, only by adding a sufficient quantity of warm water. See the article **TAPPING**.

TREASON, in general, signifies betraying; but is more particularly used for the act or crime of infidelity to one's lawful sovereign.

Treason is divided, by lawyers, into high treason, and petty treason. The first of these is an offence committed against the security of the king or kingdom; as to compass, or imagine, the death of the king, queen, or their eldest son and heir; or in case a person does violate or deflower the king's wife, or his eldest daughter unmarried, or the wife of the king's eldest son; or if he levy war against the king within his kingdom, or adhere to his enemies, give them aid or comfort within the realm, or elsewhere; or if he counterfeit the king's great or privy seal, or his money, or bring false money into the kingdom, like to what we have here, and utter the same; if he kill the chancellor, treasurer, justices of either bench, justices of assize, or of oyer and terminer, sitting in judgment and representing the person of the king, in the execution of his office: all these cases are deemed treason by 25 Ed. III. c. 2. which statute is made the only standard of high treason; and 1 Mary c. 1. takes away the power of the king and parliament to adjudge any thing else to be high treason

but what is declared to be such therein; it is true, temporary statutes of late times enacted, have made some other offences treason, as relating to papists and the protestant succession.

It has been held, that words only, where they are deliberate, and shew a direct purpose against the king's life, will amount to an overt-act of compassing or imagining his death, and are high treason: for words are the most natural way of expressing the imagination of the heart, and may be good evidence of it; not only words of persuasion to kill the king, but such as are spoken in order to draw away the affections of his people, and to stir them up against him, are tending to the king's death, and therefore treason. Likewise where a person intends by force to prescribe laws to the king, or to restrain him of his royal power, it has been adjudged an intention to deprive him of his crown and life; and in the eye of the law, every rebellion is a treasonable plot against the life of the king, for a rebel would not suffer that king to live and reign, who would punish his offence.

As to make a crime treason, there must be always some overt-act; a bare conspiracy, or compassing to levy war, is no such act, unless it be really levied; in which case the conspirators are all traitors, although they are not in arms; persons that raise forces for any public end or purpose, or who make an insurrection on any account, are said to levy war against the king, though perhaps without a direct design against his person; and it extends to the case where great numbers forcibly endeavour to remove certain persons from the king, &c. The adhering to the king's enemies, is taken to be an adherence against him, and even out of the realm it is treason: and it is said, that cruising in a ship of war with an intent to destroy the king's ships, though no act of hostility be committed, is an overt-act of adhering, comforting and aiding.

All trials for high-treason are to be according to the course of the common law; and persons indicted for this crime, are to have a copy of the indictment five days before their trial, that they may have sufficient time to advise with council; they shall likewise be permitted to make a full defence by their council learned in the law, and by lawful witnesses, &c. And in this case there must

be two evidences to the same overt-act, or to two acts of the same treason, produced face to face against them. It is also said, where a person is convicted of treason, the omission of any necessary part of the judgment will be held to be error, on which he may reverse the attainder; as the judgment is severer, and more formidable, in case of high-treason than for any other crime whatever; since the offender is to be hanged, drawn, and quartered, and also forfeit his lands and goods to the king.

Petty-treason, is where a servant kills his master, a wife her husband, or a secular or religious person kills his prelate or superior, to whom he owes faith and obedience; and aiders and abettors, as well as procurers, are within the act. However, so strictly is the statute construed, that no case not expressly mentioned therein is punishable by it: hence if a son kill his father, he shall not be tried for petty treason, except he served his father for wages, in which case he is to be indicted under the name of a servant.

Petty-treason implies the highest degree of murder, and occasions the forfeiture of lands by escheat to the lord of the fee; and the further punishment of the criminal is to be hanged, drawn, and quartered for it, and a woman burnt.

TREASURE, in general, denotes a store or stock of money in reserve. See the article **MONEY**.

Treasure trove, in law, is where any treasure is found buried in the earth, but not lying on the ground, and no man knows to whom it belongs: this, in England, belongs to the king, and to conceal it is punishable by fine and imprisonment.

TREASURER, an officer to whom the treasure of a prince, or corporation, is committed to be kept, and duly disposed of.

The lord high treasurer of Great Britain, or first commissioner of the treasury, when in commission, has under his charge and government all the king's revenue, which is kept in the exchequer. He holds his place during the king's pleasure, being instituted by the delivery of a white staff to him: he has the check of all the officers employed in collecting the customs and other royal revenues; and in his gift and disposition are all the offices of the customs in the several ports of the kingdom; escheators in every county are nominated by him; he also makes

leases of the lands belonging to the crown.

There is, besides the lord treasurer, treasurer of the king's household, who of the privy council, and, with the comptroller and steward of the marshalsea, his great power.

To these may be added the treasurer of the navy; as also the treasurer of the king's chamber, and of the wardrobe and most corporations throughout the kingdom have treasurers, whose office to receive their rents, and disburse the common expences.

The treasurer of the county, is an office that keeps the county-stock, in which office there are two in every county; who are chosen by the major part of the justices of the peace at Easter-sessions. They ought to have certain estates in lands, to be worth 150*l.* in personal estate, and are to continue in their office only for one year, at the end whereof, or within 40 days after the expiration of the year, they must account to their successors under certain penalties. The county-stock which this officer has the keeping of is raised by rating every parish annually, and the same is from time to time disposed of to charitable uses, towards the relief of maimed soldiers and mariners, prisoners in the county gaols, paying the salaries of governors of houses of correction, and relieving poor-almshouses.

TREASURY, the place wherein the revenues of a prince are received, preserved, and disbursed.

In England, the treasury is part of the exchequer, by some called the lower exchequer. See the article **EXCHEQUER**.

Lords of the TREASURY. In lieu of a single director and administrator of majesty's revenues under the title of high treasurer, it is at present thought proper to put that office in commission, *i. e.* to appoint several persons to charge it with equal authority, under the title of lords commissioners of the treasury.

TREATISE, *tractatus*, a set discourse or writing on any subject. A treatise is supposed more express, formal, and methodical than an essay, but less so than a system.

TREATY, a covenant between two or more nations; or the several articles or conditions stipulated and agreed upon between sovereign powers.

Treaties are of various kinds; as treaties of peace, of alliance, of commerce,

&c. for the guaranty of which, see the article GUARANTY.

TREBIGNA, a town of European Turkey, in the province of Dalmatia, near the gulph of Venice; east long. 19°, north lat. 42° 40'.

TREBLE, in music, the highest or acutest of the four parts in symphony, or that which is heard the clearest and shrillest in a concert. See the article CLEF.

TREE, *arbor*, the first and largest of the vegetable kind, consisting of a single trunk, out of which spring forth branches and leaves.

Standard-trees are such as naturally rise to a great height, and are not topped. For the choice of trees of this kind to be transplanted out of a nursery, Quintiney recommends us to such as are straight, six feet high at least, and five or six inches thick at bottom, and three or four at top; the bark pretty smooth and shining, as a token of their youth, and of the good soil they grew in.

Dwarf-trees are such as are kept low, and never suffered to have above half a foot or stem. See the article DWARF.

Fruit-TREES. See the article FRUIT.

For the planting, pruning, felling, grafting, &c. of trees, see the articles PLANTING, PRUNING, &c.

TREFOIL, *trifolium*, in botany, a genus of the diadelphia-decandria class of plants, with a papilionaceous flower: its fruit is a short univalve pod, or capsule, containing a few roundish seeds.

Trefoil, or clover, is a plant greatly esteemed by the English farmers, for the great improvement it makes upon land, the goodness of its hay, and the value of its seed. The great advantage of clover, or trefoil, to the land on which it grows is, that it feeds a vast number of cattle at a time; and their dung is so rich a manure to the ground, that in two or three years time it becomes fit for corn again, though it had been ever so much exhausted before. Clayey lands, in particular, are greatly improved by it.

There are several kinds of clover, but the great sort is esteemed the best, whose seed is like that of mustard, except that it is more oblong. The English seed is preferable to that of all other places, and the farmer should choose such as is of a greenish colour, with a cast of red; that which is black never growing so well. An acre of land will require ten pounds of seed, sometimes twelve pounds, and it is better to sow too much than too

little. It delights most in a rich warm soil, and always thrives best in those lands which have been well dunged or manured; but the clay-lands, which are long in acquiring a coat of grass, or swarding, as the farmers express it, and are little subject to weeds, are of all other the best land for clover; because in those lands, where the common grass grows speedily, it soon eats out the clover.

Marsh-TREFOIL, *trifolium palustre*, in botany, &c. the same with the menyanthes or buck-bean. See MENYANTHES.

Shrub-TREFOIL, *cytiscus*, in botany. See the article CYTISUS.

TREFURT, a town of Upper Saxony, twenty-two miles west of Saxe-Gotha.

TREGONY, a borough of Cornwall, forty miles south-west of Launceston.

It sends two members to parliament.

TREILEBOURG, a port town of Schonen, in Sweden, situated on the Baltic-sea, thirty miles south-east of Copenhagen.

TREMELLA, **LAVER**, in botany, a genus of sea-plants, of a middle nature, between the alga and conferva, being of a pellucid and membranaceous, and frequently of a gelatinous structure.

TREMOR, or **TREMBLING** of the joints, in medicine, is an involuntary shaking, chiefly of the hands and head, sometimes of the feet, and sometimes of the tongue and heart. It is a disorder which frequently attacks persons advanced in years, and sometimes the younger sort. It seems to arise from a defect of spirits, sometimes from terror, or other violent passion, and sometimes from a plethora. Too much drinking of coffee also produces a tremor in some persons, as too plentiful drinking and surfeits will in others.

Tremors are often dangerous, as being apt to degenerate into other nervous distempers; as spasms, the palsy, lethargy, apoplexy, &c.

In the cure, those things should be avoided that promote the disease, and the patient should drink balm or sage-tea, or a diet-drink made of china-root; peruvian bark may also be taken, in an infusion of balm or sage, or fuccinated spirit of hart's horn, twice or thrice in a day; and in the evening an antispasmodic powder may be taken, especially if the patient is hot, or uses much wine. Outwardly, the neck and spine of the back may be rubbed with the spirits of ants, earth-worms, and sal ammoniac,

mixed together; a fourth part of the volatile spirits will be sufficient, or opodeldoc may be used in their stead. If the patient is plethoric, bleeding is useful; and in old persons, a draught of generous wine at meals: pediluvia, hot-baths, and mineral-waters, may also be used, but with caution.

As to the medicine commonly used in tremors and other nervous distempers, under the name of palsy drops, it is no other than compound spirit of lavender; the most successful way of using which is, by taking thirty or forty drops twice or thrice a day, dropped on loaf-sugar or a little bread. It is supposed that by this way the most spirituous and efficacious parts make their way directly by the nerves of the palate, &c. without undergoing the course of the circulation, as it is said to do when taken in a liquid vehicle.

TRENCHES, in fortification, are ditches cut by the besiegers, that they may approach more securely to the place attacked; whence they are also called lines of approach. The tail of the trench is the place where it was begun, and its head is the place where it ends.

The trenches are usually opened, or begun, in the night time; sometimes within musket shot, and sometimes within half or whole cannon-shot of the place. They are carried on in winding-lines, nearly parallel to the works of the fortrefs, so as not to be in the view of the enemy, nor exposed to the enemy's shot. The workmen employed in the trenches are always supported by a number of troops, to defend them against the sallies of the besieged: the pioneers sometimes work on their knees, and are usually covered with mantlets or fauciflons; and the men who support them lie flat on their faces, in order to avoid the enemy's shot.

TRENCHÉ, or **TRANCHE'**, in heraldry. See the article **TRANCHE'**.

TRENT' BISHOPRIC, a province of Germany, in the circle of Austria, situated on the Alps, which divides Italy from Germany, and sometimes reckoned part of Italy; it is bounded by Tyrol on the north, by the territory of Venice on the east and south, and by the country of the Grisons on the west, being seventy miles long and fifty broad, subject to the house of Austria. Trent city, the capital of this bishopric, is situated in east long. 11°, north lat. 56° 5'. Here the famous council of Trent was held, which continued, with some intermissions, from

the year 1545 to the year 1563, where the doctrine of the pope's infallibility, transubstantiation, &c. were confirmed.

TRENT is also the name of one of the largest rivers in Great Britain, rising in the moor-lands of Staffordshire, and running south-east by Newcastle Under Line, divides that country almost into two equal parts; then entering Darbyshire, turns about to the north east; and having run the whole length of Nottinghamshire, continues its course due north, at last joining the river Ouse, and several others, it changes its name to that of Humber, and falls into the German-sea below Hull.

TRENTAL, or **TRIGINTAL**, a romish office for the dead, consisting of thirty masses rehearsed for thirty days successively after the party's death. See the article **MASS**.

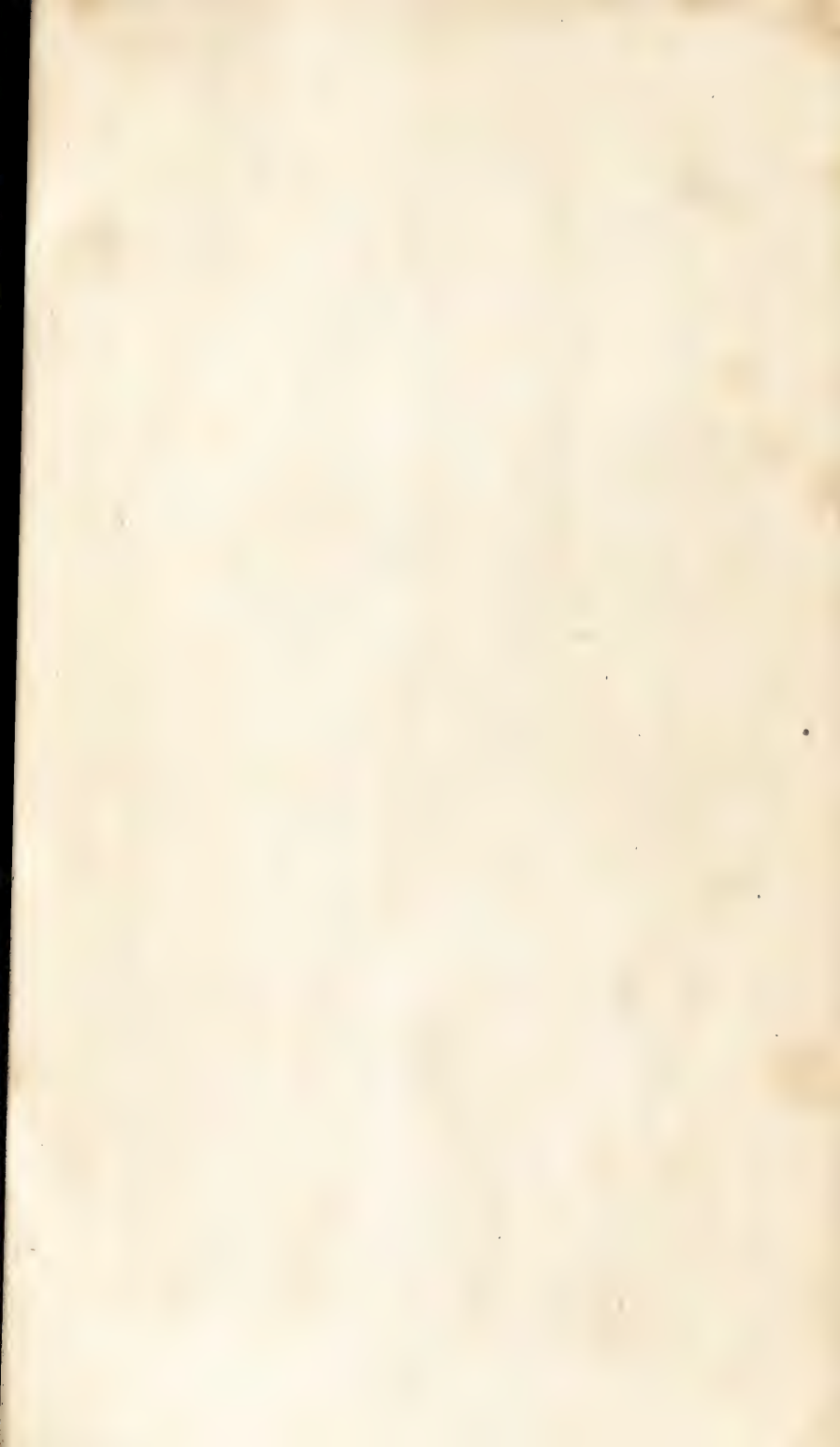
TREPAN, *terebra, modiolus*, &c. in surgery, an instrument used in trepanning. See the next article.

TREPANNING, in surgery, a perforation, or opening, made in the bones of the cranium. See the article **SKULL**.

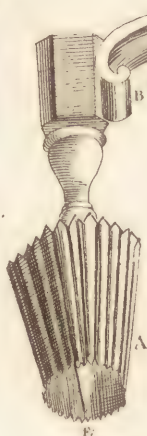
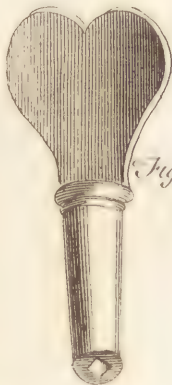
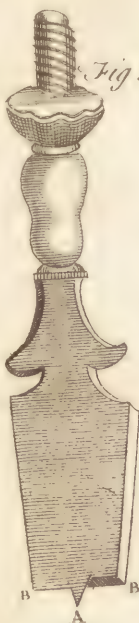
This operation was performed by the ancients, not only in fractures and depressions of the cranium, but also in those other obstinate disorders of the head and brain, which could not be relieved by internal medicines and the use of issues upon the coronal suture; but the modern surgeons never use the trepan for internal disorders of the head, though they seldom neglect it in fractures and depressions of the cranium. See the articles **FRAC-TURE**, **FISSURE**, **DEPRESSION**, &c.

The trepan is therefore useful not only in these cases, to elevate the depressed parts of a fractured bone in the cranium, but also to discharge the extravasated blood through an aperture made by this instrument. See **CONTUSION**, **EXTRAVASATION**, **CONTRA-FISSURE**, &c.

The less time there is lost the better before the application of the trepan, but the operation itself must be conducted slowly and carefully; for it is extremely difficult, if not impossible, to take out a piece of the cranium by this instrument without injuring the subjacent dura mater, to which it is most intimately attached. For this reason Heister is induced to condemn the advice of those who direct to trepan the cranium immediately upon every slight disorder of it: he therefore advises first to try the use of other remedies, both external and internal,



TREPPANNING INSTRUMENTS



nal, rather than immediately subject the patient to the trepan, before it is absolutely necessary. In general, the place where the fissure appears will be the most convenient to apply the trepan, if nothing indicates the contrary; but in fractures it will be proper to trepan a little below the injured part, that the extravasated blood may be more easily discharged. It must be next observed, that there are several places in the cranium which ought not to be in any case trepanned; such as, 1. upon the sutures, especially the sagittal suture; yet in cases of urgent necessity, the trepan may be used upon the coronal sutures, and sometimes upon the others. 2. It is equally dangerous to trepan the cranium in the middle of the os frontis, especially in that part which forms the fontanel. 3. The trepan must not be used upon any of the sinuses of the os frontis. 4. Nor ought it to be used where any large vein or artery spreads itself. 5. If the fractured part of the bone upon which you fix the trepan is loose, or carious, you might then injure the brain by this instrument. 6. It will be improper to trepan in the lower parts, or basis, of the cranium, which are invested with muscles. 7. Lastly, it will be improper to trepan upon the cruciform eminence of the os occipitale. Notwithstanding these cautions, if a violent fracture should happen in or near these parts, you should trepan as near them as possible; and if the fracture has passed across the sutures, you must trepan within a finger's breadth of the suture on each side. Sometimes it is impossible to discover the particular part of the cranium which is injured, the patient in the mean time being affected with the most dangerous and urgent symptoms. In these cases it will be necessary to trepan first on the right side, then on the left, afterwards upon the forehead, and lastly upon the occiput, and so round till you meet with the seat of the disorder.

After having pitched upon the part to be trepanned, your next business is to shave the scalp, and make an incision through the integuments to lay bare the cranium, except it be done already by the wound. The incision of the integuments may be made in the form of a cross, or of the letters X, V, or T, large enough to admit the crown of the trepan upon the bone. The wound may be enlarged, and the hæmorrhage stopped, after the

integuments and periosteum are separated and elevated from the cranium, by inserting a large quantity of scraped lint. Next a compress dipped in warm camphorated spirit of wine must be applied and retained by the kerchief bandage. Then the patient is to be left, if the disorder will permit, for a few hours, that the blood may be stopped before the trepan is applied. Among the apparatus, or instruments and dressings, which must be provided before the operation is entered upon, the first and principal is the trepan with its crown, (plate CCLXXXII. fig. 1.) made in the shape of a common gimblet with a handle turning round. The crown of this instrument, marked A, is joined to the lower part of the handle, B, by a screw, so that it may be taken off and put on at pleasure, or else that a crown of another size may be screwed in its place. The trepan is distinguished into male and female; in the first of which the crown is furnished with a sharp point E, but when the said point, or pyramid, fig. 2. is taken out by the winch, fig. 3. the trepan is then termed female. You must also be provided with a scalpel of a particular make, with a round and flat head, as represented in fig. 4. which is denominated the lenticular scalpel; to which is added another instrument for gradually depressing the dura mater, of the shape represented in fig. 5. There must be also a perforating instrument provided, fig. 6. which must be screwed into the cavity B of the handle, fig. 1. also a hair-brush and an elevatory. See the article ELEVATORY.

The apparatus of dressing and bandage, to be applied after the operation, consists of a dossil of lint, of an orbicular figure, which must be tied round the middle with a piece of thread about a span long; there must be pledgits of lint for covering the other dressings, and filling up the cavity of the cranium, &c.

The apparatus being thus provided, in order to perform the operation with greater readiness and exactness, the patient must be disposed in such a convenient posture that the surgeon and assistants may have free access to perform each their part. Then the dressings being removed, the wound is to be cleansed; after which, the head being placed in a convenient manner upon a pillow, the surgeon takes the perforating trepan, fig. 6. and adapting it to the handle B, fig. 1. instead of the crown A, so that

by turning round the handle D, he makes a full entrance, or aperture, with his instrument, and then applies the male trepan, with a crown A, fig. 1. Upon the top of the handle C C, the surgeon fixes his left hand, upon which he places his chin or forehead, while with his right he slowly and carefully turns round the handle till the crown of the trepan with its spindle have made a circular entrance deep enough in the cranium, and then he removes the spindle, and continues his work with the crown of the trepan only as long as he sees convenient; all the saw-dust being first brushed off from the cranium, and the teeth of his instrument, with the brushes. He now continues to vte the trepan till the saw-dust becomes bloody, which denotes that he has penetrated the diploë: however, he may not always meet with this sign, because in some skulls the diploë may be wanting in the part trepanned; but when the saw-dust becomes bloody the instrument is to be laid aside: and after washing away the blood with a sponge dipt in spirit of wine, he then screws the elevatory, by two or three turns, into the small aperture in the middle of the trepanned piece of the bone, and takes it out again, making two or three more turns with the crown of his trepan: then he examines with a probe, whether the plates of the cranium are sufficiently sawed through, which cannot be better known than by attending to the colour of the circular groove; for when that appears blue or grey, it is a sign that you have penetrated through the lower plate of the bone, so far as to render the dura mater almost conspicuous through it; but if the bony plate appears livid in one part of the circular groove, and white in another, it is a sign that the trepan has not cut equally through, and therefore it must be inclined and pressed a little harder upon the white parts, moving round the handle till the saw teeth of the crown have cut deep enough to make the round piece of the bone loose or moveable. In that case it will not be convenient to cut totally through the bone with the saw-teeth of the trepan.

Having thus extracted the round piece of the cranium, the blood usually follows it: which being wiped off, the surgeon is to examine whether there be any fragments remaining to be extracted and loosened; for then you must smooth the rough parts about the lower margin of

the aperture, by applying the scalpel, fig. 4. to prevent the dura mater from being pricked and injured by any of the sharp splinters. This done, the blood will more readily discharge itself, but to promote its exit you may gently incline the patient's head to one side, and another tenderly pressing the dura mater itself, either by the hand of the scalpel, or the depressor, fig. 5, by which means the patient is no sooner relieved from the pressure of the extravasated blood on his brain, but he instantly begins to recover his senses: the surgeon should then direct him to fetch a deep breath, or hold it with a strain, like one that has a hard stool.

The dressings and deligation are to be made with a round pledgit of dry lint laid next the dura mater, with a thread fastened to it, and hanging out of the aperture, that it may be placed under, and drawn out from beneath, the cranium; upon which pledgit is afterwards poured some honey of roses diluted with a little spirit of wine: you then impose a like pledgit of lint, furnished with a string with other drossils, till the cavity is replete: and, in the next place, the cranium, and wound itself, is to be dressed with lint, spread with some digestive ointment, upon which add a square compress dipt in warm spirit of wine, and then secure the whole, without a plaster, by the head bandage. In the subsequent dressings, which must be repeated once or twice every day, you must avoid fat and oily applications. See WOUND.

The wound being constantly attended, you will have an exfoliation of a thin plate from the trepanned margin of the bones, usually within forty or fifty days, which ought not to be pulled away by force. The exfoliation being obtained, there will appear new flesh and callus shooting up from the clean bone and dura mater, so as at length to fill up the whole cavity.

That instrument called the exfoliating-trepan, is sometimes used to pare away a carious part in a bone. It is represented in fig. 7, and when used is to be screwed into the handle B of fig. 1, in order to be turned round: A is its point: BB the wings, which scrape the bone while the instrument is turning about. See the article CARIES.

TREPIDATION, in medicine, the same with tremor. See the article TREMOR.

TREPIDATION, in the ancient astronomy, denotes

denotes what they called a libration of the eighth sphere, or a motion which the ptolemaic system attributed to the firmament, to account for certain almost insensible changes and motions observed in the axis of the world, by means whereof the latitudes of the fixed stars come to be gradually changed, and the ecliptic seems to approach reciprocally first towards one pole, then towards the other. This motion is called the motion of the first libration. See the articles LIBRATION and TITUBATION.

TRESPASS, in law, signifies any transgression of the law; under treason, felony, or misprison of either; but it is most commonly used for any wrong or damage that is done by one private person to another, or to the king in his forest, &c.

In this sense, trespass is of two sorts: trespass general, which is called trespass *vi et armis*; and trespass special, or trespass upon the case. Trespasses against a man's person are such as these, *viz.* threatening to hurt him, on assaulting or setting one to beat him; a battery, which is an actual beating or maiming a man so that he lose the use of his limbs; an unlawful imprisonment of another, or illegally restraining him of his liberty, &c. See ASSAULT, BATTERY, &c. Trespasses committed against a man's property may be in several ways, as against his wife, children, or servants, or his house and goods, &c. or against his lands, by carrying away the deeds, or other evidences, concerning the same; cutting trees, or damaging the grass therein. An action of trespass, *vi et armis*, lies for a person who has the possession of goods, or of a house, or land, if he be disturbed in his possession, for this reason, that such disturbance, besides the private damage, is also a breach of the peace; and in case the defendant be convicted at common law, he is liable to be fined and imprisoned. The difference between this action and trespass on the case is, that the one lies where the original act was a wrong in itself, and the other where it is consequential to a lawful act. A defendant in trespass shall in no case be excused, unless it be upon an unavoidable necessity; therefore, where there is only a force in law, as if a person enters into another's land, he must be requested to go out before hands are laid on him, but it is other-

wise when there is an actual force committed. The defendant in trespass can, by his plea, put the plaintiff to a new assignment of the place where, &c.

TRESPASSER, denotes a person that commits a trespass against another, in respect of whom it is held, that though the law permits a person to enter a tavern, and a landlord to distrain on lands, &c. yet if he abuses this liberty by committing any trespass, he will be judged a trespasser *ab initio*.

TRESSURE, in heraldry, a diminutive of an orle, usually held to be half the breadth thereof. See it represented in plate CCLXXXVIII. fig. 2.

TRET, in commerce, an allowance made for the waste, or the dirt, that may be mixed with any commodity, which is always four pounds in every one hundred and four pounds weight. See TARE.

TREVES, or TRIERS. See TRIERS.

TREVI, a town of Italy, in the pope's territory and province of Umbria, situated twenty-three miles south-east of Perugia.

TREVIGIO, or TREVISO, a city of Italy, in the territory of Venice, capital of the province of Trevigiano, situated fifteen miles north-west of Venice.

TREVOUX, a town of France, in the province of Burgundy, and territory of Bourghen-Bresse, situated on the river Saone, twenty-three miles south-west of Bourgh.

TREWIA, in botany, a genus of the polyandria-monogynia class of plants, having no corolla besides the cup: the fruit is a turbinate, triquetrous, coronated, trilocular, trivalvar capsule: the seed is single, convex on one side, and angular on the other. See plate CCLXXXV. fig. 2.

TREZZO, a town of Italy, in the duchy of Milan, situated on the river Adda, fifteen miles north-east of Milan.

TRIA PRIMA, among chemists, the three hypostatical principles, *viz.* salt, sulphur, and mercury; of which they hold all bodies to be primarily made, and into which they are all held resolveable by fire.

TRIAL, in law, the examination of a cause, civil or criminal, according to the laws of the land, before a proper judge; or, it is the manner and order observed in the hearing and determining of causes. There are divers kinds of trials; as those of matters of fact, which must be

tried by a jury; matters of law, which are only triable by the courts; and matters of record, which are to be tried by the records themselves. The most general rule has been, that the jurymen on a trial shall be chosen out of that town or precinct, &c. in which the matter of fact is alledged, or the nearest thereto, for the better cognizance of the matter, and not to leave things to be tried in foreign countries, where the jury are strangers to the whole matter. Where any trial is for murder, it must be in the county wherein the fact was committed; but if the assault be in one county, and the person assaulted happens to die in another county, the indictment may be found by a jury of the county where the party died: and by special commission, when a person is indicted in one county he may be tried in another. In all criminal cases the custom is to ask the prisoner how he will be tried, which was formerly a very significant question, though it is not so now, because antiently there were trials by combat, by ordeal, and by jury; and when the prisoner answered, by God and his country, it appeared he made choice to be tried by a jury; which is the only way now used for the trial of criminals. See **COMBAT**, **MURDER**, &c. The method of proceeding in criminal cases is this: first the bill of indictment against the offender is prepared, and the prosecutor and his witnesses attend on the grand-jury therewith, and there give in their evidence; which being done, the grand inquest either find the bill of indictment, or bring it in *ignoramus*; and if the bill be found, the prisoner is brought to the bar of the court, and the clerk of the arraignment calling him by his name, desires him to hold up his hand, saying, "Thou art indicted by the name of — —, for such a felony, &c. (setting forth the crime laid in the indictment.) How sayest thou, art thou guilty of this felony whereof thou art indicted, or not guilty?" To which the prisoner answering, "Not guilty," the clerk says, "Culprit, how wilt thou be tried?" whereupon the defendant answers, "By God and my country;" which plea of the prisoner the clerk records, and then the pannel of the petty-jury is called over. See **IGNORAMUS**, **CULPRIT**, **JURY**, &c.

After the jury are sworn, and the indictment is read over to them, and they are

charged, the evidences on both sides, for and against the prisoner, are called, sworn, and examined in open court; after which the jury bring in their verdict; and if they find the prisoner guilty, their verdict is recorded, and the prisoner is taken from the bar: but if they bring him in not guilty, the prisoner is bid to fall down on his knees, &c. On the prisoners being brought in guilty, proclamation is made for all persons to keep silence, upon which the prisoner is again brought to the bar, and the verdict repeated: after which sentence is passed on him, and an order, or warrant, is made for his execution. See the articles **FELONY**, **WARRANT**, &c.

The methods of trial, in our civil courts, are as follows: *viz.* The declaration is first drawn for the plaintiff, and when the appearance of the defendant is entered, it has been usual to deliver it with an imparlance to the defendant's attorney; and the term following rule is to be given with the secondary for the defendant to plead by such a day, or else the plaintiff is to have judgment: and the defendant having pleaded, a copy of the issue is made by the plaintiff, and delivered to the defendant's attorney, at the same time giving him notice of the trial; in order to which the *venire facias* must be taken out and returned by the sheriff; and likewise the *babeas corpora*, or *disfringas*, to bring in the jury; on which the record is made up, and the parties proceed to trial by their council and witnesses, and the jury give in their verdict, &c. But in case the defendant neglects to plead, and suffers it to go by default, on entering such a judgment, a writ of inquiry of damages is awarded returnable next term; notice of the execution whereof the defendant's attorney is to have, and which being executed, and the damages inserted in a schedule annexed to the writ, a rule is given thereon, and costs are taxed by the prothonotary, &c. See the articles **DECLARATION**, **IMPARLANCE**, &c.

TRIANDRIA, in the linnæan system of botany, a class of plants, the third in order; comprehending all such plants as have hermaphrodite flowers, with three stamina, or male parts, in each; whence the name.

To this class belong the tamarind, valerian, saffron, gladiol, iris, &c. See the article **TAMARIND**, &c.



TRIANGLE, in geometry, a figure of three sides and three angles.

Triangles are either plane or spherical. A plane triangle is contained under three right lines; and a spherical one is a triangle contained under three arches of great circles of the sphere. See the article **SPHERE**.

Triangles are denominated, from their angles, right, obtuse, and acute. A right-angled triangle is that which has one right angle, as *ABC*, pl. *CCLXXXIII*. fig. 1. n° 1. An obtuse-angled triangle is such as has one obtuse angle; as *DEF*; *ibid.* n° 2. And an acute-angled triangle is that which has all its angles acute; as *ghi*, *GHI*, *ibid.* n° 3. and 4. See the article **ANGLE**.

And here it may not be improper to explain other distinctions of triangles. Any triangle that is not right-angled, is called oblique-angled, or amblygonial. An equilateral-triangle is that which has all its sides equal; as *ghi*, *ibid.* n° 3. An isosceles-triangle is one that has only two sides equal; as *GHI*, *ibid.* n° 4. And a scalenous-triangle is one that has no two sides equal; as *DEF*, *ibid.* n° 2.

In every triangle the sines of the sides are proportional to the sines of the opposite angles; also the sine of all the three angles is equal to two right ones; and the external angle, made by any side produced, is equal to the sum of the two internal and opposite angles: thus $\angle eED$, (*ibid.* n° 2.) $= \angle EFD + FDE$. Triangles on the same base, and having the same height or place, between the same parallels, are equal: also triangles on equal bases, and between the same parallels, are equal. If a perpendicular be let fall upon the base of an oblique-angled triangle, the difference of the squares of the sides is equal to the double-rectangle under the base, and the distance of the perpendicular from the middle of the base. The side of an equilateral-triangle, inscribed in a circle, is in power triple of the radius. The sides of a triangle are cut proportionably, by a line drawn parallel to its base. A whole triangle is to a triangle cut off by a right line drawn parallel to the base, as the rectangle under the cut sides is to the rectangle of the two other sides. In a right-angled triangle, a line drawn from the right-angle at the top, perpendicular to the hypotenuse, divides the

triangle into two other right-angled triangles, which are similar to the first triangle, and to one another. In every right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides; that is, AC^2 (*ibid.* n° 1.) $= AB^2 + BC^2$. If any angle of a triangle be bisected, the bisecting-line will divide the opposite side in the same proportion as the legs of the angle are to one another. Every triangle is one half of a parallelogram of the same base and height.

The area of any triangle may be had by adding all the three sides together, and taking half the sum, and from that half sum subtracting each side severally, and multiplying that half sum and the remainder continually into one another, and extracting the square root of the product.

For the solving the several cases of plane and spherical triangles, see the article **TRIGONOMETRY**.

TRIANGULAR Compasses, are such as have three legs, or feet, whereby to take off any triangle at once; much used in the construction of maps, globes, &c.

TRIANGULAR Numbers, are a kind of polygonal numbers, being the sums of arithmetical progressions, the difference of whose terms is 1.

Thus of arithmetical progression, 123456, are formed triangular numbers 136101521.

TRIANGULAR Canon, the tables of artificial sines, tangents, secants, &c.

TRIANGULAR Quadrant, is a sector furnished with a loose piece, whereby to make it an equilateral triangle.

The calendar is graduated thereon, with the sun's place, declination, and other useful lines; and by the help of a string and a plummet, and the divisions graduated on the loose piece, it may be made to serve for a quadrant.

TRIANGULARIS, in anatomy, a name given to two muscles of the lips, which arise each from the lateral and under part of the lower jaw; from whence they ascend obliquely to the angle of the orbicularis.

There is also a muscle of the breast called triangularis sterni, which rises from the lower and interior part of the sternum, and is inserted on each side into the cartilages of the fourth, fifth, sixth, and seventh true ribs: it is one of the constrictor or depressor muscles of the breast.

One of the dilatator^a muscles of the urethra is called triangularis from its figure: it rises from the anterior part of the sphincter of the anus, and is inserted into the posterior and lower parts of the accelerators, or else into the bulb of the urethra.

TRIARI, in the roman militia, a kind of infantry armed with a pike, a shield, a helmet, and a cuirass; thus called because they made the third line of battle.

TRIAS HARMONICA, or *the harmonical TRIAD*, in music, a compound of three radical sounds, heard all together, two whereof are a fifth and third above the other, which is a fundamental.

TRIBE, *tribus*, in antiquity, a certain quantity or number of persons, when a division is made of a city or people into quarters or districts.

The tribes of antient Rome bore a great resemblance to our wards. See the article **WARD**.

TRIBRACHYS, in antient poetry, a foot consisting of three syllables, and those all short; as *melius*.

TRIBULUS, **CALTROP**, in botany, a genus of the decandria-monogynia class of plants, the corolla of which consists of five oblong, obtuse, and patent petals: its fruit is of a roundish figure and aculeated, being composed of five capsules, gibbous on one side, and armed with three or four points on the other, angulated and convergent; and containing numerous seeds, turbinate and oblong.

TRIBUNAL, in general, denotes the seat of a judge, called in our courts bench. See the article **BENCH**.

The word is latin, and takes its origin from the seat where the tribune of the roman people was placed to administer justice.

The name tribunal was also given to the place from whence the people of antient Rome were harangued.

TRIBUNE, *tribunus plebis*, among the antient Romans, a magistrate chosen out of the commons, to protect them against the oppressions of the great, and to defend the liberty of the people against the attempts of the senate and consuls.

The tribunes of the people were first established in the year of Rome 259. The first design of the creation was to shelter the people from the cruelty of usurers, and to engage them to quit the Aventine mount, whither they had retired in displeasure.

Their number, at first, was but two; but the next year, under the consulate of A. Posthumus Aruncius and Cassius Viscellinus, there were three more added; and this number of five was afterwards increased, by L. Trebonius, to ten. The appellation, tribune, was given them, by reason they were at first chosen out of the tribunes of the army.

Military TRIBUNE, *tribunus militum*, or *militaris*, an officer in the Roman army, who commanded in chief over a body of forces, particularly the division of a legion, much the same with our colonel, or the french mestre de camp.

TRIBUNE was also an appellation given to various other officers; as the *tribuni aerarii*, tribunes of the treasury. Tribune of the celeres, the officer who commanded them. *Tribuni fabricarum*, those who had the direction of the making of arms. *Tribuni marinorum*, *tribuni nolanorum*, *tribuni voluptatum*, mentioned in the Theodosian Code, as intendants of the public shews, and other diversions. The title of tribune, *tribunus*, was also given to the chief of each tribe.

TRIBUTARY, *tributarius*, one who pays tribute to another, in order to live in peace with him, or share in his protection.

TRIBUTE, *tributum*, a tax or impost which one prince or state is obliged to pay to another as a token of dependence, or in virtue of a treaty, and as a purchase of peace.

The Romans made all the nations they subdued pay them tribute. Mahomet laid it down as a fundamental of all his law, that all the world should pay him tribute. In the states of the grand seignior christian children are taken by way of tribute. See the article **AGEMOGLANS**. Tribute is sometimes also used for a personal contribution, which princes lay upon their subjects, by way of political money.

TRICEPS, in anatomy, the abductor muscle of the thigh, having three heads and as many insertions: the first and second heads of this muscle arise from the os pubis, near the lynchondrosis; the third, from the tubercle of the ischium and it is inserted into the whole spine of the os femoris.

TRICHECUS, or **THRICHECHUS**. See the article **TRICHECHUS**.

TRICHERIE, a genus of fossils, naturally and essentially simple, not inflated

inable nor soluble in water; being fibrofe bodies, not elastic, and composed of straight and continuous filaments. See the article FIBRARIÆ.

To this genus belongs the gypsum striatum of authors, with several other species. See the article GYPSUM.

TRICHESTRUM, in natural history, the name of a genus of fossils, of the class of the selenitæ, but differing extremely in figure and structure from the common kinds. See the article SELENITÆ.

The selenitæ of this genus are composed of filaments scarce any where visibly arranged into plates or scales, but disposed in form of a radiated star, made of a number of disjunct striæ.

TRICHIASIS, in surgery, an inversion of the eye-lids, whereby the eye lashes hurt the eyes.

According to Heister, this disorder is very difficultly remedied; since it is hardly possible to remove it, so as to prevent its returning, without extirpating the offending hairs; and if these be cut off close, it will be to no purpose, because the rigid stumps of the hairs will irritate the eye even worse than the whole hairs did before. It is a very nice operation alone that can make a cure; here the hairs must be pulled up singly by the roots, and the places of their insertion singly cauterized with a hot broad pointed needle; but this the patient will seldom submit to, and the only remaining method then, is to fill up the sinus's out of which they were extracted with the lapis infernalis. But in this the greatest care must be taken, that no part of that application get into the eye. The easiest method is the touching the cavities, out of which the hairs have been pulled up, with a pencil-brush dipped in a mixture of spirit of sal-armoniac and highly rectified spirit of wine, by which means they will close up, and no more hairs will grow from them.

TRICHOSANTHES, in botany, a genus of the monoecia-syngenesia class of plants, the corolla of which is monopetalous, divided into five segments, and is ciliated: the stamina are three very short filaments: the fruit is an oblong apple. This genus comprehends the anguina of Micheli.

TRICHOSTEMA, in botany, a genus of the didynamia-gymnospermia class of plants, with a monopetalous ringent and falcated flower: the stamina are four extremely long filaments; and

four roundish seeds are contained in the cup.

TRICUSPIDES VALVÆ, in anatomy, a name given to the mitral valves, placed at the juncture of the right auricle and ventricle of the heart. See HEART.

TRIDAX, in botany, a genus of the syngenesia-polygamia superflua class of plants, with a radiated flower, and the lesser hermaphrodite ones of the disc monoperalous, and funnel-fashioned: the seeds are winged with down, and contained in the cup.

TRIDENT, *tridens*, an attribute of Neptune, being a kind of sceptre which the painters and poets put into the hands of that god, in form of a spear, or fork, with three teeth; whence the word.

TRIDENT, among mathematicians, is used for a kind of parabola, by which Des Cartes constructed equations of six dimensions.

TRIEDROSTYLA, in natural history, the name of a genus of spars, in form of trigonal columns, adhering by one end to some solid body, and terminated at the other by a trigonal pyramid. See SPAR. Of this genus there are four known species. 1. A slender one, with a long, obtuse pyramid: this is one of the most common of all the spars, and is found in almost all parts of the world, sometimes in single and large specimens, but more frequently in large congeries, coating over the fissures of stone, in form of crusts. 2. One with short, but pointed pyramids, common on Mendip-hills, and found in some other parts of England. 3. A thick one, with a longer pyramid, found in Northamptonshire, and some other parts of the kingdom, encrusting the fissures of stone. And, 4. One with a very short column, and a long, obtuse pyramid: this is frequent in the mines of Germany, and not less so in those of England, particularly in Derbyshire.

TRIEMIMERIS, a kind of cæsura in latin verse, wherein after the first foot of the verse there remains an odd syllable, which helps to make up the next foot.

TRIENNIAL, an epithet applied chiefly to offices or employments which last for three years.

TRIENS, in antiquity, a copper money of the value of one third of an as, which on one side bore a Janus's head, and on the other a water-rat.

This was the piece of money used to be

put in the mouths of the deceased to pay Charon his fare, for their passage into another life.

TRIENTALIS, in botany, a genus of the heptandria-monogynia class of plants; with a stellated monopetalous flower: its fruit is a dry, globose and unilocular berry, containing a few angulated seeds.

TRIERS, or **TREVES**, the capital of the electorate of Triers, in Germany, situated on the river Moselle, sixty miles south of Cologne: east long. $6^{\circ} 10'$, north lat. $49^{\circ} 55'$.

TRIXAHÆDRIA, in natural history, the name of a genus of perfect and pellucid, crystalliform spars, consisting of thrice six planes, being composed of an hexangular column, terminated at each end by an hexangular pyramid. Of this genus there are three known species.

1. A clear one, with narrow and oblong pyramids: this is found in the mountains of Germany and in North-Wales; but with us it is small and coarse. 2. One with short pyramids, and a long column: this is found in the mines at Gosselaer, in Saxony. And, 3. One with short pyramids, and a thick and short column, found with us in the lead-mines of Yorkshire. See the article **SPAR**.

TRIESTE, a port-town of Istria, situated on the gulph of Venice, sixty miles north-east of that city.

TRIFOLIUM, **TREFOIL**, in botany. See the article **TREFOIL**.

TRIGA, in antiquity, denotes a kind of carr, or chariot, drawn by three horses; whence the name.

TRIGAMY, a third marriage, or the state of a person who has been married three times. See **MARRIAGE**.

TRIGLA, in ichthyology, a genus of fishes, of the order of the acanthopterygii, the characters of which, according to Artedi, are these: the branchiostegic membrane contains several bones; the head is very declivious, from the eyes to the end of the snout, and is large, aculeated, and as it were square; the head is the broadest part of the fish; it thence grows gradually narrower, till it ends in a very small tail: in many of the species of this fish, there are two or three articulated appendices growing under the pectoral fins: the eyes stand on the top of the head, and are covered with a skin; there are two back fins, the first of which is prickly; the pectoral fins in some of the species are very large.

This genus comprehends the mullet, hirundo pisces, tub-fish, gurnard, &c. See the article **MULLET**, &c.

TRIGLOCHIN, in botany, a genus of grasses, belonging to the hexandria-trigynia class of plants, the flower of which consists of three oval, concave, and obtuse petals; and its fruit is an oblong capsule of an oval figure, with three cells, in each of which is a single oblong seed.

TRIGLYPHS, in architecture, a sort of ornaments repeated at equal intervals in the doric freeze. See the articles **DORIC** and **FREEZE**.

Each triglyph consists of two entire gutters, or channels, cut to a right angle, called glyphs, and separated by three interstices, called, by Vitruvius, femora, from each other, as well as from two other half channels which are at the sides.

The ordinary proportion of triglyphs is to be a module broad, and one and a half high. But this proportion, M. le Clerc observes, sometimes occasions ill-proportioned intercolumnations in porticos; for which reason he chuses to accommodate the proportion of his triglyphs to that of the intercolumnns.

TRIGON, $\tau\rho\iota\gamma\omega\upsilon\omicron\varsigma$, a triangle. See the article **TRIANGLE**.

In astrology, trigon denotes the same with trine. See the article **TRINE**.

TRIGONELLA, in botany, a genus of the diadelphia-decandria class of plants, with a papilionaceous tetrapetalous flower: the fruit is an oblong, oval pod, of a compressed figure, and containing several roundish seeds.

TRIGONOMETRY, that part of geometry, which teaches how to measure the sides and angles of triangles. See the article **TRIANGLE**.

Trigonometry is either plane or spherical, according as the triangles are plane or spherical; of each whereof we shall treat in order.

Plane **TRIGONOMETRY**, or that which teaches the mensuration of plane triangles, is commonly divided into rectangular and oblique-angular.

I. And first of rectangular plane trigonometry; if in any right-angled triangle ABC (plate CCLXXXIII. fig. 2. n^o 1.) the hypotenuse be made the radius, and with that a circle be described on the one end, A, as a center; then, it is plain that BC will be the sine of the angle BAC.

BAC



BAC; and if with the same distance, and on the end B as a center, a circle be described it is plain that AC will be the sine of the angle ABC; therefore, in general, if the hypotenuse of a right angled triangle be made the radius, the two legs will be the sines of their opposite angles. See SINE, RADIUS, &c.

Again, if in a right-angled triangle DEF (*ibid.* n° 2.) one of the legs, as DF, be made the radius, and on the extremity D (at one of the oblique angles, *viz.* that which is formed by the hypotenuse and the leg made radius) as a center, a circle be described; it is plain that the other leg, EF, will be the tangent of the angle at D, and the hypotenuse DE will be the secant of the same angle. The same way, making the leg EF the radius, and on the center E describing a circle, the other leg DF will become the tangent of the angle at E, and the hypotenuse DE the secant of the same. See the articles TANGENT and SECANT.

The chord, sine, tangent, &c. of any arch, or angle, in one circle, is proportionable to the chord, sine, tangent, &c. of the same arch in any other circle: from which, and what has been said above, the solutions of the several cases of rectangular trigonometry naturally follow. See CHORD, ARCH, &c.

Since trigonometry consists in determining angles and sides from others given, there arises various cases; which being seven in rectangular-trigonometry, are as follow.

Case I. The angles, and one of the legs, of a right-angled triangle be given, to find the other leg.

Example. In the triangle ABC (*ibid.* n° 3.) right-angled at B, suppose the leg AB = 86 equal parts; as feet, yards, miles, &c. and the angle A = 33° 40'; required the other leg BC, in the same parts with AB.

1. Geometrically: Draw AB = 86, from any line of equal parts; upon the point B, erect the perpendicular BC; and, lastly, from the point A, draw the line AC, making with AB an angle of 33° 40'; and that line produced will meet BC in C, and so constitute the triangle. The length of BC may be found by taking it in your compasses, and applying it to the same line of equal parts that AB was taken from.

2. By calculation: First, by making

the hypotenuse AC radius, the other two legs will be the sines of their opposite angles, *viz.* AB the sine of C, and CB the sine of A. Now since the sine, tangent, &c. of any arch in one circle is proportionable to the sine, tangent, &c. of the same arch in any other circle, it is plain the sines of the angles A and C in the circle described by the radius AC, must be proportional to the sine of the same arches or angles, in the circle, that the table of artificial sines, &c. was calculated for; so the proportion for finding BC will be

$$S, C : A B :: S, A : B C$$

i. e. As the sine of the angle C in the tables, is to the length of AB (or sine of C in the circle whose radius is AC) so is the sine of the angle A in the tables, to the length of BC (or sine of the same angle in the circle whose radius is AC.) Now the angle A being 33°, 40', the angle C must be 56°, 20'; therefore looking in the table of artificial sines, &c. for the sines of the two angles, and in the table of logarithms for the logarithm of 86 the given leg, we shall find by proceeding according to the foregoing proportion, that the required leg BC, is 57.28; and the operation will stand as follows:

1.93450	AB	86
9.74380	S, A	33°, 40'
11.67830		
9.92027	S, C	56°, 20'
1.75803	BC	28

Secondly, Making the radius, it is plain BC, the leg required, will be the tangent of the given angle A, and so the proportion for finding BC, when AB is made the radius, will be:

$$R : T, A :: A B : B C$$

i. e. as the radius in the tables, is to the tangent of the angle A in the same, so the length of BA, or radius in the scheme, to the length of BC or tangent of A in the scheme; therefore looking in the tables for the parts given in the foregoing proportion, and proceeding with them according to that rule, we shall find BC to be 57.28 as before, and the operation will be as follows:

9.82352	T, A	33°, 40'
1.93450	A B	86
11.75802		
10.00000	Rad.	90°
1.75802	BC	57.28

18 U 2

Lastly,

Lastly, by making BC, the leg required, the radius, it is plain that AB will be the tangent of C, and the proportion for finding BC will be as follows:

$$T, C : R :: AB : BC$$

i. e. as the tangent of C $56^{\circ}, 20'$ 10.17648
is to radius - - 90° 10.00000
so is the length of AB 86 1.93450

11.93450
10.17648

to the length of BC 57.28 1.75802

Case II. The angles and one of the legs given, to find the hypotenuse.

Example: In the triangle ABC, (*ibid.* n^o 4.) suppose AB 124, and the angle A $34^{\circ}, 20'$; consequently the angle C $55^{\circ}, 40'$, required the hypotenuse AC, in the same parts with A B.

1. Geometrically: this case is constructed after the same manner with the former; and the hypotenuse, AC, is found, by taking its length in your compasses, and applying that to the same line of equal parts from which AB was taken.

2. By calculation: first, making AC the radius, we shall have the following proportion for finding AC, *viz.*

$$S, C : R :: AB : AC$$

i. e. as the sine of C $55^{\circ}, 40'$ 9.91686
is to radius - - 90° 10.00000
so is AB - - 124 2.09342
to AC - - 150.2 2.17656

Secondly, making AB the radius, we have this proportion, *viz.*

$$R : \sec, A :: AB : AC$$

i. e. as the radius 90° 10.00000
to the secant of A $34^{\circ}, 20'$ 10.08314
so is AB - - 124 2.09342
to AC - - 150.2 2.17656

This may also be done, without the help of the secants; for since $R : \sec. :: Co-S : R$; therefore, the former proportion will become,

$$Co-S, A : R :: AB : AC$$

i. e. as the co-sine of A $34^{\circ}, 20'$ 9.91686
is to the radius 90° 10.00000
so is AB - - 124 2.09342
to AC - - 150.2 2.17656

Thirdly, Making BC the radius, we have the following proportion, *viz.*

$$T, C : \sec, C :: AB : AC$$

i. e. as the tangent of C $55^{\circ}, 40'$ 10.16558
is to sec. C - - $55^{\circ}, 40'$ 10.24872
so is AB - - 124 2.09342
to AC - - 150.2 2.17656

This likewise may be done without the help of secants; for since $T, : \sec. :: S,$

R ; therefore the former analogy will be reduced to this, *viz.*

$$S, C : R :: AB : AC$$

where no secants do appear, and it coincides with that in the first supposition of this case, so we shall not repeat the operation.

Case III. The angles and hypotenuse given, to find either of the legs.

Example: In the triangle ABC, (*ibid.* n^o 4.) suppose the hypotenuse AC = 146, and the angle A = $36^{\circ}, 25'$; consequently the angle C = $53^{\circ}, 35'$; required the leg AB.

1. Geometrically: draw the line AB at pleasure, and make the angle BAC equal to $36^{\circ}, 25'$; then take AC equal to 146 from any line equal parts; lastly, from the point C, let fall the perpendicular CB, on the line AB. So the triangle is constructed, and AB may be measured from the line of equal parts.

2. By calculation: first, making AC the radius, we shall have the following proportion, *viz.*

$$R : S, C :: AC : AB$$

i. e. As radius 90° 10.00000
to the sine of C $53^{\circ}, 35'$ 9.90565
so is AC 146 2.16435
to AB 117.5 2.07000

Secondly, making AB the radius, we have the following analogy, *viz.*

$$\sec, A : R :: AC : AB$$

i. e. As the secant of A $36^{\circ}, 25'$ 10.09435
is to radius 90° 10.00000
so is AC 146 2.16435
to AB 117.5 2.07000

This may also be done without the help of secants; for since $\sec. : R :: R : Co-S$, the former proportion may be reduced to this, *viz.*

$$R : Co-S, A :: AC : AB$$

which is the same with the proportion in the first supposition.

Thirdly, By supposing BC the radius, we have the following proportion, *viz.*

$$\sec, C : T, C :: AC : AB$$

i. e. as the secant of C $53^{\circ}, 35'$ 10.22647
is to the tangent of C $53^{\circ}, 35'$ 10.13212
so is AC 146 2.16435
to AB 117.5 2.07000

Case IV. The two legs being given, to find the angles.

Example: In the triangle ABC, (*ibid.* n^o 5.) suppose AB 94 and BC 56, required the angles A and C.

1. Geometrically: draw AB equal to 94, from any line of equal parts, then from the point B raise BC perpendicular

to AB, and take BC, from the former line of equal parts equal to 56; lastly, join the points A and C with the straight line AC, so the triangle is constructed, and the angles may be measured by a line of chords. See the articles SCALE and SECTOR.

2. By calculation: first, supposing AB the radius, we have this analogy, *viz.*

$$AB : BC :: R : T, A,$$

i. e. as AB 94 1.97313
is to BC 56 1.74819
so is the radius 90° 10.00000
to the tangent of A 30° 47' 9.77506
Secondly, making BC the radius, we have this proportion, *viz.*

$$BC : BA :: R : T, C.$$

i. e. as BC 56 1.74819
is to AB 94 1.97313
so is the radius 90° 10.00000
to the tangent of C 59° 13' 10.22494

Case V. The hypotenuse and one of the legs given, to find the angles.

Example: In the triangle DEF, (*ibid.* n° 6.) suppose the leg DE = 83, and the hypotenuse DF = 126; required the angles D and F.

1. Geometrically: draw the line DE = 83, from any line of equal parts; and, from the point E, raise the perpendicular EF: then take the length of DF = 126, from the same line of equal parts; and setting one foot of your compasses in D, with the other cross the perpendicular EF in E: Lastly, join D and F; and the triangle being thus constructed, the angles may be measured by a line of chords.

2. By calculation: first, making DF the radius, we shall have this proportion, *viz.*

$$DF : DE :: R : S, F.$$

i. e. as DF 126 2.10037
is to DE 83 1.91908
so is radius 90° 10.00000
to the sine of F 41° 12' 9.31871
Secondly, by supposing DE the radius, we have the following analogy, *viz.*

$$DE : DF :: R : \text{Sec. D.}$$

i. e. as DE 83 1.91908
is to DF 126 2.10037
so is radius 90° 10.00000
to the secant of D 48° 48' 10.18129
This may be done without the help of secants; for since $R : \text{sec.} :: \text{Co-S.} : R$, the foregoing analogy will become this, *viz.*

$$DF : DE :: R : \text{Co-S. D.}$$

which gives the same answer, with that deduced from the first supposition.

Case VI. The two legs being given, to find the hypotenuse.

Example: In the triangle ABD, (*ibid.*

n° 7.) suppose the leg AB = 64, and BD = 56: required the hypotenuse.

1. Geometrically: the construction of this case is performed the same way as in the fourth case, and the length of the hypotenuse is found by taking it in your compasses, and applying it to the same line of equal parts, that the two legs were taken from.

2. By calculation: this case being a compound of the fourth and second cases, we must first find the angles by the fourth, thus:

$$AB : DB :: R : T, A.$$

i. e. as the leg AB 64 1.80618
is to the leg DB 56 1.74819
so is the radius 90 10.00000
to the tangent of A 41° 11' 9.94201
Then by the second case we find the hypotenuse required thus:

$$S, A : R :: BD : AD,$$

i. e. as the sine of A 41° 11' 9.81854
is to the radius 90° 10.00000
so is the leg BD 56 1.74819
to the hypoth. AD 85.05 1.92965
This case may also be solved after the following manner, *viz.*

From twice the log. of the greater

side AB - 3.61236

subtract the log. of the lesser

side BD 1.74819

and there remains - 1.86417

the logarithm of 73.15; to which adding the lesser side BD, we shall have 189.15 whose log. is - 2.11093

to which add the log. of the lesser side BD - 1.74819

and the sum will be 3.85912

the half of which is 1.92956

the logarithm of the hypotenuse required. See the article LOGARITHM.

Or it may be done by adding the square of the two sides together, and taking the logarithm of that sum, the half of which is the logarithm of the hypotenuse required: thus, in the present case, the square of AB (64) is 4096
the square of BD (56) is 3136
the sum of these squares is 7232
the log. of which is 3.85926
the half of which is 1.92963 =
to the logarithm of 85.05, the length of the hypotenuse required.

Case VII. The hypotenuse and one of the legs being given, to find the other leg. Example: in the triangle BGD, (*ibid.* n° 8.) suppose the leg BG = 87, and the hypotenuse BD = 142; required the leg DG,

7. Geometrically: the construction here is the same as in case V. the same things being given; and the leg DG is found by taking its length in your compasses, and applying that to the same line of equal parts, the others were taken from.

2. By calculation: the solution of this case depends upon the 1st and 5th, and first we must find the oblique angles by case 5th thus:

$$DB : BG :: R : S, D.$$

i. e. as the hypoth. DB 142 2.15229
is to the leg BG 87 1.93952
so is radius 90°, 10.00000
to the sine of D 37°, 47' 9.78723
Then by case 1st, we find the leg DG required, thus:

$$R : S, B :: BD : DG,$$

i. e. as radius 90° 10.00000
is to the sine of B 52°, 13' 9.89781
so is the hypoth. DB 142 2.15229
to the leg DG 112.2 2.05010

The leg DG may also be found in the following manner, *viz.*

To the log. of the sum of the
hypotenuse and given leg, } 2.35984
viz. 229

add the log. of their difference, *viz.* 55

and their sum is 4.10020
the half of that is 2.05010
the log. of 112.2 the leg required.

Or it may be done by taking the square of the given leg from the square of the hypotenuse, and the square root of the remainder is the leg required: thus, in the present case.

The square of the hypotenuse
(142) is 20164
The square of the leg BG (87) is 7569
Their difference is 12595
Whose logarithm is 4.10020
The half of which is 2.05010
which answers to the natural number
112.2 the leg required.

Thus have we gone through the seven cases of right-angled plane-trigonometry; from which we may observe; 1. That to find a side, when the angles are given, any side may be made the radius. 2. To find an angle, one of the given sides must of necessity be made the radius.

II. We now proceed to oblique-angled plane-trigonometry, in which there are six cases; but before we shew their solution, it will be proper to premise the following theorems.

Theorem 1. In any triangle ABC (plate

CCLXXXIV. fig. 1. n° 1.) the sides are proportional to the sines of the opposite angles: thus, in the triangle ABC, $AB : BC :: S, C : S, A$, and $AB : AC :: S, C : S, B$: also $AC : BC :: S, B : S, A$.

Demonstration: let the triangle ABC be inscribed in a circle; then, it is plain (from the property of the circle) that the half of each side is the sine of its opposite angle: but the sines of these angles, in tabular parts, are proportional to the sines of the same in any other measure; therefore, in the triangle ABC, the sines of the angles will be as the halves of their opposite sides; and since the halves are as the wholes, it follows, that the sines of the angles are as their opposite sides; i. e. $S, C : S, A :: AB : BC$, &c.

Theor. 2. In any plane triangle, as ABC (*ibid.* n° 2.) the sum of the sides, AB and BC, is to the difference of these sides, as the tangent of half the sum of the angles BAC, ABC, at the base, is to the tangent of half the difference of these angles.

Demon. Produce AB; and make BH equal to BC; join HC, and from B let fall the perpendicular BE; through B draw BD parallel to AC, and make HF equal to CD, and join BF; also take BI equal to BA, and draw IG parallel to BD or AC.

Then it is plain that AH will be the sum, and HI the difference of the sides AB and BC; and since HB is equal to BC, and BE perpendicular to HC, therefore HE is equal to EC; and BD being parallel to AC and IG, and AB equal to BI, therefore CD or HF is equal to GD, and consequently HG is equal to FD, and half HG is equal to half FD or ED. Again, since HB is equal to BC, and BE perpendicular to HC, therefore the angle EBC is half the angle HBC; but the angle HBC is equal to the sum of the angles A and C, consequently the angle EBC is equal to half the sum of the angles A and C. Also since HB is equal BC, and HF equal to CD, and the included angles BHF, BCD equal, it follows that the angle HBF is equal to the angle DBC, which is equal to BCA; and since HBD is equal to the angle A, and HBF equal to BCA, therefore FBD is the difference, and EBD half the difference of the two angles A and BCA; so making

making EB the radius, it is plain EC is the tangent of half the sum, and ED the tangent of half the difference of the two angles at the base. Now IG being parallel to AC, the triangles HIG and HAC will be equiangular; consequently $AH : IH :: CH : GH$; but the wholes are as their halves, therefore $AH : IH :: \frac{1}{2}CH : \frac{1}{2}GH$; and since $\frac{1}{2}CH$ is equal to EC, and $\frac{1}{2}GH$ equal to $\frac{1}{2}FD = ED$, therefore $AH : IH :: EC : ED$. Now AH is the sum, and IH the difference of the sides; also EC is the tangent of half the sum, and ED the tangent of half the difference of the two angles at the base; consequently, in any triangle, as the sum of the sides is to their difference, so is the tangent of half the sum of the angles at the base to the tangent of half their difference.

Theorem 3. If to half the sum of two quantities be added half their difference, the sum will be the greater of them; and if from half their sum be subtracted half their difference, the remainder will be the least of them. Suppose the greater quantity to be $x = 8$, and the lesser $z = 6$; then is their sum 14, and difference 2:

wherefore, adding $\frac{14}{2} = 7$ to $\frac{2}{2} = 1$, we get 8 the greatest of the two quantities:

and, in the same manner, $\frac{14}{2} - \frac{2}{2} = 7 -$

$1 = 6$, the least of the two quantities.

Theor. 4. In any right-lined triangle, ABD (*ibid.* n° 3.) the base AD is to the sum of the sides AB and BD; as the difference of the sides is to the difference of the segments of the base made by the perpendicular BE, *viz.* the difference between AE and ED.

Demon. Produce DB till BG be equal to BA the lesser leg; and on B as a center with the distance BA or BG, describe the circle AGHF, which will cut BD and AD in the points H and F; then it is plain GD is the sum, and HD the difference of the sides; also since AE is equal to EF; therefore FD is the difference of the segments of the base; but $AD : GD :: HD : FD$; therefore the base is to the sum of the sides, &c. as was to be proved.

Having established these preliminary theorems, we shall now proceed to the solution of the six cases of oblique-angled plane trigonometry.

Case I. In any oblique-angled plane tri-

angle, two sides and an angle opposite to one of them being given, to find the angle opposite to the other.

Example: In the triangle ABC (*ibid.* n° 4.) suppose $AB = 156$, $BC = 84$, and the angle C (opposite to AB) $= 56^\circ 30'$; required the angle A, opposite to BC.

1. Geometrically: Draw the line AC, and at any point of it, suppose C, make the angle $C = 56^\circ 30'$; then take $CB = 84$, and with the length of $156 = AB$ taken in your compasses from the same scale of equal parts, fixing one point in B, with the other cross AC in A. Last'y, join A and B; so the triangle is constructed, and the required angle A may be measured by a line of chords.

2. By calculation: We have, by theor. 1. the following proportion for finding the angle A, *viz.*

$$AB : BC :: S, C : S, A.$$

i. e. as $AB = 156$ - - - 2.19312
To $BC = 84$ - - - 1.92428
So is $S, C = 56^\circ 30'$ - 9.92111
To $S, A = 26^\circ 41'$ - 9.65227

Case II. The angles, and a side opposite to one of them, being given, to find a side opposite to another.

Example: In the triangle HBG (*ibid.* n° 5.) suppose the angle H $46^\circ 15'$, and the angle B $54^\circ 22'$, consequently the angle G $79^\circ 23'$, and the leg HB 125, required HG.

Geometrically: Draw HB 125, from any line of equal parts, and make the angle H $46^\circ 15'$, and B $54^\circ 22'$, then produce the lines HG and BG till they meet one another in the point G; so the triangle is constructed, and HG is measured by taking its length in your compasses, and applying it to the same line of equal parts that HB was taken from.

2. By calculation: By the first of the preceding theorems, we have this analogy for finding HG, *viz.*

$$S, G : HB :: S, B : HG.$$

i. e. As the line of G $79^\circ 23'$ 9.99250
is to the leg HB - 125 - 2.09691
so is the line of B - $54^\circ 22'$ - 9.90996
to the leg HG - 103.4 - 2.01437

Case III. Two sides and an angle opposite to one of them given, to find the third side.

Example: In the triangle KLM (*ibid.* n° 6.) suppose the side CL 126 equal parts, and KM 130 of these parts, and the angle L (opposite to KM) $63^\circ 20'$, required the side ML.

1. Geometrically: The construction of this

this case is the same with that in Case I. (there being the same things given in both) and the leg ML may be measured by applying it to the same line of equal parts that the other two were taken from.

2. By calculation: The solution of this case depends upon the two preceding ones; and, first, we must find the other two angles by Case I. thus:

$$MK : S, L :: KL : S, M.$$

i. e. As the side MK 130 2.11394
 To the sine of L $63^{\circ} 20'$ 9.95116
 So is the side KL 126 2.10037
 To the sine of M $60^{\circ} 1'$ 9.93759
 Then by Case II. we have the required leg ML , thus:

$$S, L : S, K :: MK : ML.$$

i. e. As the sine of L $63^{\circ} 20'$ 9.95116
 To the sine of K $53^{\circ} 39'$ 9.90602
 So is MK 130 2.11394
 To ML 117.2 2.06850

Case IV. Two sides and the contained angle being given, to find the other two angles.

Example: In the triangle ACD (*ibid.* n^o 7.) suppose $BC = 103$, $AD = 126$, and the angle $A = 54^{\circ} 30'$; required the angles C and D .

1. Geometrically: Draw $AD = 126$, and make the angle $A = 54^{\circ} 30'$; then set off 103 equal parts from A to C ; lastly, join C and D ; and so the triangle is constructed, and the angles C and D may be measured by a line of chords.

2. By calculation: The solution of this case depends upon the second and third of the preceding theorems; and first we must find the sum and difference of the sides, and half the sum of the unknown angles, thus:

The leg AD is	- - - -	126
The leg AC is	- - - -	103
Their sum is	- - - -	229
And their difference is	- - - -	23
The sum of the three angles	} - - - -	180°
A , D and C is	- - - -	
The angle A is	- - - -	$54^{\circ} 30'$

So the sum of the angles C and D will be $125^{\circ} 30'$

And half their sum is $62^{\circ} 45'$
 Then by theor. 2. we have the following proportion, viz.

As the sum of the sides AD	} - - - -	2.35984
and $AC = 229$	- - - -	
To their difference	- 23 - - - -	1.36173

So is the tangent of half the sum of the unknown angles C and D $62^{\circ} 45' 10.28816$

To tang. of half their difference $11^{\circ} 2' 9.29005$

Now having half the sum and half the difference of the two unknown angles C and D , we find the quantity of each of them by theorem 3. thus:

To half the sum of the angles C and D , viz. $62^{\circ} 45'$

Add half their difference, viz. $11^{\circ} 02'$

And the sum is the greater angle C $73^{\circ} 47'$

Again, from half their sum, viz. $62^{\circ} 45'$

Take half their difference, viz. $11^{\circ} 02'$

And there will remain the lesser angle D $= 51^{\circ} 43'$

N. B. The greater angle is always that subtended by the greater side: thus, in the present case, the greater angle C , is subtended by the greater side AD ; and the lesser angle D , is subtended by the lesser side AC .

Case V. Two sides and the contained angle being given, to find the third side.

Example. In the triangle BCD (*ibid.* n^o 8.) suppose $BC = 154$, $BD = 133$, and the angle $B = 56^{\circ} 03'$; required the side CD .

1. Geometrically: The construction of this case is the same with that of the last, and the length of DC is found by taking its length in your compasses, and applying it to the same line of equal parts that the two legs were taken from.

2. By calculation: The solution of this case depends upon the second and fourth, and first we must find the angles by the last case; thus:

As the sum of the sides BD 2.45788
 and BC 287 - - - -

Is to their difference 21 - - - - 1.32222

So is the tangent of half the sum of the angles D and C $61^{\circ} 58' 10.27372$

To the tangent of half their difference $7,50'$ - - - - 9.13806

So by theorem 3. we have the angles D and C thus:

To half the sum of the angles D and C $61^{\circ} 58'$

Add half their difference $7^{\circ} 50'$

And the sum is the greater angle D $69^{\circ} 48'$

Also, from half the sum $61^{\circ} 58'$

Take half the difference $7^{\circ} 50'$

And there remains the lesser angle C $54^{\circ} 08'$

Then by Case II. we have the following analogy for finding DC the leg required, viz.

S, C,

S, C : B D :: S, B : D C.

i. e. As the sine of C $54^{\circ} 08'$ 9.90869
To B D - - - 133 2.12385
So is the sine of B $56^{\circ} 03'$ 9.91883
To D C - - - 136.2 2.13399

Cafe VI. Three sides being given, to find the angles.

Example: In the triangle ABC (*ibid.* n^o 9.) suppose AB = 156, AC = 185.7, and BC = 84; required the angles A, B, and C.

1. Geometrically: Make AC = 185.7 from any line of equal parts; and from the same line taking 156 = AB in your compasses, fix one foot of them in A, and with another sweep an arch; then take 84 = BC in your compasses, and fixing one foot in C, with the other sweep an arch, which will cross the former in B: lastly, join the points B and A, and B and C; so the triangle will be constructed, and the angles may be measured by a line of chords.

2. By calculation: Let fall the perpendicular, B D, from the vertex B, upon the base AC; which will divide the base into two segments A D and D C, the lengths whereof may be found by theor.

4. thus:
As the base AC - 185.7 - 2.26893
To the sum of the sides AB }
and BC 240 - - - } 2.38031
So is the diff. of the sides 72 1.85733
To the difference of the seg- }
ments of the base 93 } 1.96371

And having the sum of the segments, *viz.* the whole base, and their difference, we find the segments themselves, by theorem 3. thus:

To half the sum of the segments - 92.8
And half their difference - - - 46.5
And the sum is the greater seg. AD 139.3
Also from half the sum of the seg. 92.8
Take half, their difference 46.5

The remainder is the lesser seg. D C 46.3
Now the triangle ABC is divided, by the perpendicular DB, into two right-angled triangles, ADB, and DBC; in the first of which are given the hypothenuse AB = 156, and the base AD = 139.3, to find the oblique angles, for which we have (by Cafe V. of rectangular trigonometry) the following analogy, *viz.*

As AB - - - 156 2.19312
To AD - - - 139.3 2.14395
So is the radius - 90^o 10.00000
To the co-sine of the }
angle A - - - } 26^o 40' 9.95083

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Also the angle C is found by the same case, thus:

As BC - - - 84 - 1.92428
To CD - - - 46.3 - 1.66558
So is the radius 90^o - 10.00000

To the co-sine of C $56^{\circ} 30'$ 9.74130

Having found the two angles A and C, we have the third, B, by taking the sum of the other two from 180, thus:

The sum of all the three angles is 180^o
The sum of A and C is - 83^o 10'

The angle B is - - - 96^o 30'

All the proportions used for the solutions of the several cases in plain trigonometry, may be performed by the scale and compass. On the scale there are several logarithmic lines, *viz.* one of numbers, another of sines, and one of tangents, &c. See the article SCALE.

And the way of working a proportion by these is this, *viz.* extend your compasses from the first term of your proportion, found on the scale, to the second, and with that extent, fixing one foot in the third term, the other will reach the fourth term required.

Spherical TRIGONOMETRY, is the art whereby, from three given parts of a spherical triangle, we discover the rest; and, like plane trigonometry, is either right-angled, or oblique-angled. But before we give the analogies for the solution of the several cases in either, it will be proper to premise the following theorems. Theorem 1. In all right-angled spherical triangles, the sine of the hypothenuse: radius :: sine of a leg: sine of its opposite angle. And the sine of a leg: radius :: tangent of the other leg: tangent of its opposite angle.

Demonstration: Let E D A F G (plate CCLXXXIV. fig. 2. n^o 1.) represent the eighth part of a sphere, where the quadrantal planes E D F G, E D B C, are both perpendicular to the quadrantal plane A D F B; and the quadrantal plane A D G C is perpendicular to the plane E D F G; and the spherical triangle A B C is right-angled at B, were C A is the hypothenuse, and B A, B C, are the legs.

To the arches G F, C B, draw the tangents H F, O B, and the sines G M, C I, on the radii D F, D B; also draw B L the sine of the arch A B, and C K the sine of A C; and then join I K and O L. Now H F, O B, G M, C I, are all perpendicular to the plane A D F B. And H D, G K, O L, lie all in the same plane A D G C. Also F D, I K, B L, lie all

in the same plane $ADGC$. Therefore, the right-angled triangles HFD , CIK , ODL , having the equal angles HDF , CKI , OLB , are similar. And $CK : DG :: CI : GM$; that is, as the sine of the hypotenuse : rad. :: sine of a leg : sine of its opposite angle. For GM is the sine of the arc GF , which measures the angle CAB . Also, $LB : DF :: BO : FH$; that is, as the sine of a leg : rad. :: tang. of the other leg : tang. of its opposite angle. *Q. E. D.*

Hence it follows, that the sines of the angles of any oblique spherical triangle ACD (*ibid.* n° 2.) are to one another, directly, as the sines of the opposite sides. Hence it also follows, that, in right-angled spherical triangles, having the same perpendicular, the sines of the bases will be to each other, inversely, as the tangents of the angles at the bases.

Theorem 2. In any right-angled spherical triangle ABC (*ibid.* n° 3.) it will be, as radius is to the co-sine of one leg, so is the co-sine of the other leg to the co-sine of the hypotenuse.

Hence, if two right-angled spherical triangles ABC , CBD (*ibid.* n° 2.) have the same perpendicular BC , the co-sines of their hypotenuses will be to each other, directly, as the co-sines of their bases.

Theorem 3. In any spherical triangle it will be, as radius is to the sine of either angle, so is the co-sine of the adjacent leg to the co-sine of the opposite angle.

Hence, in right-angled spherical triangles, having the same perpendicular, the co-sines of the angles at the base will be to each other, directly, as the sines of the vertical angles.

Theorem 4. In any right angled spherical triangle it will be, as radius is to the co-sine of the hypotenuse, so is the

tangent of either angle to the co-tangent of the other angle.

As the sum of the sines of two unequal arches is to their difference, so is the tangent of half the sum of those arches to the tangent of half their difference; and, as the sum of the co-sines is to their difference, so is the co-tangent of half the sum of the arches to the tangent of half the difference of the same arches.

Theorem 5. In any spherical triangle ABC (*ibid.* n° 4. and 5.) it will be, as the co-tangent of half the sum of the two sides is to the tangent of half their difference, so is the co-tangent of half the base to the tangent of the distance (DE) of the perpendicular from the middle of the base.

Since the last proportion, by permutation, becomes co-tang. $\frac{AC+BC}{2}$: co-

tang. $AE :: \text{tang. } \frac{AC-BC}{2}$: tang.

DE , and as the tangents of any two arches are, inversely, as their co-tangents; it follows, therefore, that tang. AE :

tang. $\frac{AC+BC}{2} :: \text{tang. } \frac{AC-BC}{2}$:

tang. DE ; or, that the tangent of half the base is to the tangent of half the sum of the sides, as the tangent of half the difference of the sides to the tangent of the distance of the perpendicular from the middle of the base.

Theorem 6. In any spherical triangle ABC (*ibid.* n° 4.) it will be, as the co-tangent of half the sum of the angles at the base, is to the tangent of half their difference; so is the tangent of half the vertical angle to the tangent of the angle which the perpendicular CD makes with the line CF bisecting the vertical angle,

The Solution of the Cases of right-angled spherical Triangles, (*ibid.* n^o 3.)

Case	Given	Sought	Solution
1	The hyp. AC and one angle A	The opposite leg BC	As radius : line hyp. AC :: line A : line BC (by the former part of theor. 1.)
2	The hyp. AC and one angle A	The adjacent leg AB	As radius : co-line of A :: tang. AC : tang. AB (by the latter part of theo. 1.)
3	The hyp. AC and one angle A	The other angle C	As radius : co-line of AC :: tang. A : co-tang. C (by theorem 4.)
4	The hyp. AC and one leg AB	The other leg BC	As co-line AB : radius :: co-line AC : co-line BC (by theorem 2.)
5	The hyp. AC and one leg AB	The opposite angle C	As line AC : radius :: line AB : line C (by the former part of theorem 1.)
6	The hyp. AC and one leg AB	The adjacent angle A	As tang. AC : tang. AB :: radius : co-line A (by theorem 1.)
7	One leg AB and the adjacent angle A	The other leg BC	As radius : line AB :: tangent A : tangent BC (by theorem 4.)
8	One leg AB and the adjacent angle A	The opposite angle C	As radius : line A :: co-line of AB : co-line of C (by theorem 3.)
9	One leg AB and the adjacent angle A	The hyp. AC	As co-line of A : radius :: tang. AB : tang. AC (by theorem 1.)
10	One leg BC and the opposite angle A	The other leg AB	As tang. A : tang. BC :: radius : line AB (by theorem 4.)
11	One leg BC and the opposite angle A	The adjacent angle C	As co-line BC : radius :: co-line of A : sin. C (by theorem 3.)
12	One leg BC and the opposite angle A	The hyp. AC	As sin. A : sin. BC :: radius : sin. AC (by theorem 1.)
13	Both legs AB and BC	The hyp. AC	As radius : co-line AB :: co-line BC : co-line AC (by theorem 2.)
14	Both legs AB and BC	An angle, suppose A	As line AB : radius :: tang. BC : tang. A (by theorem 4.)
15	Both angles A and C	A leg, suppose AB	As line A : co-line C :: radius : co-line AB (by theorem 3.)
16	Both angles A and C	The hyp. AC	As tang. A : co-tang. C :: radius : co-line AC (by theorem 4.)

Note, The 10th, 11th, and 12th cases are ambiguous; since it cannot be determined by the data, whether AB, C, and AC, be greater or less than 90 degrees each.

The Solution of the Cases of oblique spherical Triangles, (*ibid.* n^o 4 and 5.)

Case	Given	Sought	Solution
1	Two sides AC, BC, and an angle A opposite to one of them.	The angle B opposite to the other	As line BC : line A :: line AC : line B (by theor. 1.) Note, this case is ambiguous when BC is less than AC; since it cannot be determined from the data whether B be acute or obtuse.
2	Two sides AC, BC, and an angle A opposite to one of them.	The included angle A C B	Upon AB produced (if need be) let fall the perpendicular CD: then (by theor. 4.) rad. : co-line AC :: tang. A : co-tang. ACD; but (by theor. 1.) as tang. BC : tang. AC :: co-line ACD : co-line BCD: Whence ACB = ACD ± BCD is known.

Case	Given	Sought	Solution
3	Two sides AC, BC, and an angle opposite to one of them	The other side AB	As rad. : co-line A : : tang. AC : tang. AD (by theor. 1.) and (by theor. 2.) as co-sin. AC : co-sin. BC : : co-sin. AD : co-sin. BD. Note, this and the last case are both ambiguous when the first is so.
4	Two sides AC, AB, and the included angle A.	The other side BC	As rad. : co-sin. A : : tang. AC : tan. AD (by theor. 1.) whence BD is also known : then (by theor. 2.) as co-sin. AD : co-sin. BD : : co-sin. AC : co-sin. BC.
5	Two sides AC, AB, and the included angle A	Either of the other angles, suppose B	As rad. : co-line A : : tang. AC : tan. AD (by theorem 1.) whence BD is known : then (by theor. 4.) is sine BD : sine AD : : tan. A : tan. B.
6	Two angles A, ACB, and the side AC betwixt them	The other angle B	As rad. : co-line AC : : tang. A : co-tang. ACD (by theor. 4.) whence BCD is also known : then (by theor. 3.) as sine ACD : sine BCD : : co-sine A : co-sine B.
7	Two angles A, ACB, and the side AC betwixt them	Either of the other sides, suppose BC	As rad. : co-line AC : : tang. A : co-tang. ACD (by theo. 4.) whence BCD is also known : then, as co-sine BCD : co-sine ACD : : tang. AC : tang. BC (by theor. 1.)
8	Two angles A, B, and a side AC opposite to one of them	The side BC opposite the other	As sine B : sine AC : : sine A : sine BC (by theorem 1.)
9	Two angles A, B, and a side AC opposite to one of them	The side AB betwixt them	As rad. : co-sine A : : tang. AC : tan. AD (by theor. 1.) and as : tang. B : tang. A : : sine AD : sine BD (by theor. 4.) whence AB is also known.
10	Two angles A, B, and a side AC opposite to one of them	The other angle ACB	As rad. : co-sine AC : : tang. A : co-tang. ACD (by theor. 4.) and as co-sine A : co-sine B : : sine ACD : sine BCD (by theor. 3.) whence ACB is also known.
11	All the three sides AB, AC, and BC	An angle, suppose A	As tang. $\frac{1}{2} AB$: tang. $\frac{AC+BC}{2}$: : tang. $\frac{AC-BC}{2}$: tang. DE, the distance of the perpendicular from the middle of the base (by theor. 6.) whence AD is known : then, as tang. AC : tang. AD : : rad. : co-sine A (by theorem 1.)
12	All the three angles A, B, and ACB	A side, suppose AC	As co-tan. $\frac{ABC+A}{2}$: tan. $\frac{ABC-A}{2}$: : tang. $\frac{ACB}{2}$: tang. of the angle included by the perpendicular and a line bisecting the vertical angles : whence ACD is also known : then (by theor. 5.) tang. A : co-tang. ACD : : rad. : co-sine AC.

Note, in letting fall your perpendicular, let it always be from the end of a given side, and opposite to a given angle.

TRILLION, in arithmetic, a billion of billions. See **NUMERATION**.

TRILLO, in music, the same with cadence. See the article **CADENCE**.

TRIM of a ship, her best posture, proportion of ballast, and hanging of her masts, &c. for sailing. To find the trim of a ship, is to find the best way of making her sail swiftly, or how she will sail best. This is done by easing of her masts and shrouds; some ships sailing much better when they are slack, than when they are taut or fast: but this depends much upon experience and judgment, and the several trials and observations which the commander and other officers may make aboard.

TRIMACRUS, or **TRIMACER**, a foot, in antient poetry, the same with the molossus. See **MOLOSSUS** and **FOOT**.

TRIMMERS, in architecture, pieces of timber framed at right-angles to the joints, against the ways for chimneys, and well-holes for stairs.

TRINE, in astrology, the aspect or situation of one star with regard to another, when they are distant 120 degrees: it is noted with this character Δ .

TRING, a market-town of Hertfordshire, twenty-four miles west of Hertford.

TRINGA, in ornithology, a genus of birds belonging to the order of the scolopaces, the characters of which are these: the beak is of a cylindric figure, obtuse at the extremity, and in length about equal to the toes: the feet have each four toes, and they are connected.

To this genus belongs the ruff, the cinclus, the lapwing, the godwit, the tolk, grey plover, &c. See the articles **RUFF**, **CINCLUS**, &c.

TRINGLE, in architecture, a name common to several little square members or ornaments, as reglets, listels, and platbands.

TRINGLE is more particularly used for a little member fixed exactly over every triglyph, under the plat-band of the architrave, from whence the guttæ or pendant drops hang down.

TRINIDAD, or **TRINITY-ISLAND**, is situated in the Atlantic or American ocean, between 60° and 62° of west longitude, and between 9° and 11° of north latitude; it is about ninety miles long, and sixty broad.

TRINIDAD, a port-town of Mexico, in America, situated in the province of

Guatimala, an hundred and twenty miles south-east of the city of Guatimala; west long. 94°, north lat. 13°.

TRINITARIANS, those who are orthodox and believe in the trinity: those who do not believe therein, being called anti-trinitarians.

Trinitarians also denote an order of religious instituted at Rome in the year 1198, under the pontificate of Innocent III. the founders whereof were John de Matha, and Felix de Valois. His holiness gave them permission to establish this order for the deliverance of captives, who groaned under the tyranny of the infidels: he gave them, as a habit, a white gown ornamented with a red and blue cross. After the death of the two founders, pope Honorius III. continued the order, and their rule was approved by his successor Clement IV. in 1267. At first they were not permitted to eat flesh, and, when they travelled, were to ride only upon asses. But their rule was corrected and mitigated by the bishop of Paris, and the abbots of St. Victor and St. Genevieve, who allowed them to eat any kind of food, and to use horses. This order possesses about two hundred and fifty convents in thirteen different provinces: six of which are in France; namely, France, Normandy, Picardy, Champagne, Languedoc, and Provence; three in Spain, *viz.* New Castile, Old Castile, and Arragon; one is in Italy, and one in Portugal. There was formerly the province of England, where this order had forty-three houses; that of Scotland, where it had nine; and that of Ireland, where it had fifty-two; besides a great number of monasteries in Saxony, Hungary, Bohemia, and other countries. The convent of Cerfroy in France is head of the order.

There are also nuns of the trinitarian order established in Spain, by John de Matha himself, who built them a convent in 1201, under the direction of the infanta Constantia, daughter of Peter II. king of Arragon, who was the first religious, and the first superior of that order. And, in 1612, Frances de Romero, daughter of Julian de Romero, lieutenant-general of the spanish army, founded a convent of barefooted trinitarian-nuns at Madrid.

TRINITY, *trinitas*, in theology, the ineffable mystery of three persons in one God; Father, Son, and Holy Spirit. See the article **GOD**, &c.

The

The doctrine of the trinity, as professed in the christian church, is as follows: that there is but one God in three distinct persons, Father, Son, and Holy Ghost; *person* signifying the same as *essence*, with a particular manner of subsistence, which the Greek fathers call hypostasis, taking it for the incommunicable property that makes a person. The Father, Son, and Holy Ghost are believed to be three distinct persons in the divine nature, because the scriptures, in speaking of these three, distinguish them from one another, as we use in common speech to distinguish three several persons. There are many instances to this purpose; particularly the form of administering the sacrament of baptism, which runs in the name of the Father, the Son, and the Holy Ghost: and that solemn benediction, with which St. Paul concludes his second epistle to the Corinthians: "The grace of our Lord Jesus Christ, &c." and the three witnesses in heaven, mentioned by St. John. Each of these three persons are affirmed to be God, because the names, properties, and operations of God are, in the holy scripture, attributed to each of them.

The divinity of the Father is undisputed. That of the Son is proved from the following texts, among many others. St. John says, "The Word was God;" St. Paul, "That God was manifested in the flesh; that Christ is over all, God blessed for ever." Eternity is attributed to the Son: "the Son hath life in himself:" perfection of knowledge: "as the Father knoweth me, so know I the Father." And we are commanded, "To honour the Son, as we honour the Father." The divinity of the Holy Ghost rests upon the following proofs, among others: Lying to the Holy Ghost, is called "lying to God:" because Christians are the temples of the Holy Ghost, they are said to be the "temples of God." "His teaching all things; his guiding into all truth; his telling things to come; his searching all things, even the deep things of God, &c." are adduced as plain characters of his divinity. Besides, he is joined with God the Father, as an object of faith and worship, in baptism, and the apostolical benediction. Many of the heathens seem to have had a notion of the trinity in the Godhead; Plato and his followers speak of it in such terms, that the primitive fathers have

been accused of borrowing the doctrine itself from the platonic school. This point is treated at large in Cudworth's Intellectual System.

The several anti-trinitarian heresies may be seen under their respective articles. See ARIANS, SABELLIANS, SOCINIANS, &c.

TRINITY-SUNDAY, a festival of the christian church, observed on the Sunday next after Whitsunday, in honour of the holy and undivided trinity. The observance of this festival was first enjoined in the council of Arles, *anno* 1260.

TRINITY-HOUSE, a kind of college at Deptford, belonging to a company or corporation of seamen, who, by the king's charter, have power to take cognizance of those persons who destroy sea-marks, and to get reparation of such damages, and to take care of other things belonging to navigation. At present, many gentry and some nobility are members of that community.

The master, wardens, and assistants of the trinity-house, may set up beacons and marks for the sea, in such places near the coasts or forelands, as to them shall seem meet. By a statute of queen Elizabeth, no steeple, trees, or other things standing as sea-marks, shall be taken away or cut down, upon pain that every person guilty of such offence, shall forfeit 100 l. and if the person offending be not possessed of the value, he shall be deemed convict of outlawry.

Fraternity of the TRINITY, a religious society instituted at Rome by St. Philip Neri, in 1548. These religious were appointed to take care of the pilgrims who came to visit the tombs of St. Peter and St. Paul. The society originally consisted of only fifteen religious, who assembled on the first Sunday of every month, in the church of St. Saviour de Campo, to hear the exhortations of the founder; after whose death pope Paul IV gave the fraternity the church of St. Benedict, near which they have since built a large hospital, for the reception of pilgrims. The fraternity is one of the most considerable in Rome, and most of the nobility of both sexes have been members thereof.

TRINOMIAL, or TRINOMIAL ROOT in mathematics, is a root consisting of three parts connected together by the signs + or —, as $x + y + z$, or $a - b - c$. See BINOMIAL and ROOT.

TRINQUIMALE, a port-town of the island of Ceylon, situated on the north

east part of the island: east long. 80°, north lat. 9°.

TRIO, in music, a part of a concert wherein three persons sing; or more properly a musical composition consisting of three parts. Trios are the finest kinds of composition, and these are what please most in concerts.

TRIOCLITE, in astrology, an aspect or situation of two planets with regard to the earth, when they are three octants or eight parts of a circle, *i. e.* 135° distant from each other. This aspect, which some call the sesquiquadrans, is one of the new aspects superadded to the old ones by Kepler.

TRIONES, in astronomy, a sort of constellation or assemblage of several stars in the ursa minor, commonly called Charles's wain. See the article **URSA**.

TRIONUM, in botany, a genus of the monadelphia-polyandria class of plants, the corolla whereof consists of five patent petals, vertically cordated, and united together at the base: the fruit is an ovated quinquangular capsule, consisting of five cells, and containing five valves: the seeds are numerous, and kidney-shaped.

TRIOPTERIS, in botany, a genus of the decandria-trigynia class of plants, the corolla whereof consists of six oval, erecto-patulous, equal and permanent petals, surrounded by three others smaller than themselves, but equal to one another: there is no pericarpium: the seeds are three, erect and carinated at the back; each of them has externally at its base an ala, and at its apex two; these ala are what in the flowering state of the plant appear to be petals, but they are not truly such.

TRIOURS, in law, are such persons as are chosen by the court to examine whether a challenge made to the whole panel of jurors, or any part of them, be just or not.

TRIP, a sea-term. A ship is said to bear her top-sails a-trip, when she carries them hoisted up to the highest.

TRIPARTITE, *tripartitus*, something divided into three parts, or made by three parties, as indenture tripartite, &c.

TRIPARTITION, a division by three, or the taking the third part of any number or quantity.

TRIPELAS, in natural history, earths composed of apparently similar particles, naturally dry, and of rough dusty surfaces, but somewhat more firmly coherent than the ochres, composed of fine

but hard particles, and not readily dissoluble in water. Of this genus of earths authors make five species, which may be reduced to the yellowish and the reddish; for an account of which, see the article **TRIPOLI**.

TRIPENTAHÆDRIA, in natural history, the name of a genus of spars, composed of thrice five planes, being made of a pentangular column, terminated at each end by a pentangular pyramid. Of this genus we have only one species: this has a moderately long column, and very short and broad pyramids; it is found in Derbyshire, Yorkshire, and Cornwall, and is frequent about Gosselaer, in Saxony.

TRIPHTHONGUE, in grammar, an assemblage or concurrence of three vowels in the same syllable, as *queæ*.

TRIPLE, threefold. See the article **RATIO** and *Sub-TRIPLE*.

TRIPLE, in music, is one of the species of measure or time. See the articles **TIME** and **MEASURE**.

Triple-time consists of many different species, whereof there are in general four, each of which has its varieties. The common name triple is taken hence, that the whole half of the bar is divisible into three parts, and is beaten accordingly. The first species is called the simple triple, wherein the measure is equal to three semibreves, three minims, three crotchets, three quavers, or three semiquavers, which are marked thus, $\frac{3}{4}$ $\frac{3}{8}$ $\frac{3}{16}$, but the last is not much used, except in church music. In all these the measure is divided into three equal parts or times, called thence triple-time, or the measure of three times; whereof two are beat down, and the third up. The second species is the mixed triple; its measure is equal to six crotchets, or six quavers, or six semiquavers, and accordingly is marked $\frac{6}{4}$ or $\frac{6}{8}$ or $\frac{6}{16}$; but the last is seldom used. The measure here is usually divided into equal parts or times, whereof one is beat down and one up; but it may also be divided into six times, whereof the first two are beat down and the third up, then the next two down and the last up; *i. e.* each half of the measure is beat like the simple triple (on which account it may be called the compound triple) and because it may be thus divided either into two or six times (*i. e.* two triples) it is called mixed, and by some the measure of six times. The third species is the compound triple, consisting of nine crotchets

or quavers, or semiquavers, marked $\frac{2}{8}$ $\frac{2}{16}$, the first and last are little used; some also add $\frac{2}{4}$, which are never used; some add also other two, viz. six semibreves and six minims, marked $\frac{6}{4}$ or $\frac{6}{2}$, but these are not in use. This measure is divided into three equal parts or times, whereof two are beat down and one up; or each third part may be divided into three times, and beat like the simple triple, on which account it is called the measure of the nine times. The fourth species is a compound measure of the second species, containing twelve crotchets or quavers, or semiquavers, marked $\frac{12}{4}$ $\frac{12}{8}$ $\frac{12}{16}$, to which some add $\frac{12}{2}$ and $\frac{12}{1}$, which are never used; nor are the first and third much used; especially the latter. The measure here may be divided into two times, and beat one down and one up; or each half may be divided and beat as the second species, either by two or three, in which case it will make in all twelve times; and hence it is called the measure of twelve times. The french and italian authors make a great many more species and divisions of triple-time, unknown, or at least unregarded, by our english musicians, and therefore not necessary to be dwelt on here.

TRIPPLICATE RATIO, the ratio which cubes bear to one another. See CUBE. This ratio is to be distinguished from triple ratio, and may be thus conceived. In the geometrical proportions 2, 4, 8, 16, 32, as the ratio of the first term (2) is to the third (8) duplicate of that of the first to the second, or of the second to the third, so the ratio of the first to the fourth is said to be triplicate of the ratio of the first to the second, or of that of the second to the third, or of that of the third to the fourth, as being compounded of three equal ratios. See the article RATIO.

TRIPLICATION, *triplicatio*, in the civil law, the same with sur-rejoinder. See the article SUR-REJOINDER.

TRIPPLICITY, or **TRIGON**, among astrologers, is a division of the signs according to the number of the elements, each division consisting of three signs. Triplicity is frequently confounded with trine aspect, though strictly speaking the two are very different things; as triplicity is only used with regard to the signs, and trine, on the contrary, with regard to the planets. The signs of triplicity are those which are of the same nature, and not those which are in trine aspect.

Thus leo, sagittarius, and aries, are signs of triplicity, because those signs are by these writers all supposed fiery.

TRIPOD, *tripos*, in antiquity, a famed sacred seat or stool, supported by three feet, whereon the priests and sibyls were placed to render oracles. It was on the tripod that the gods were said to inspire the Pythians with that divine fury and enthusiasm wherewith they were seized at the delivery of their predictions.

TRIPOLI, a state of Africa, which including Barca, is bounded by the Mediterranean-sea on the north, by Egypt on the east, by Nubia and Bildulgerid on the south, and by Tunis on the west; extending along the shore of the Mediterranean from the north-west to the south-east about a thousand miles, but scarce two hundred miles broad in any place. The city of Tripoli, being the capital of this state, is surrounded with a wall and other fortifications: east long. $14^{\circ} 30'$, north lat. $33^{\circ} 30'$.

TRIPOLI is also a port-town of Syria, situated on the Levant, being the chief town of that part of Syria antiently called Phœnicia, situated at the foot of mount Libanus: east long. $36^{\circ} 15'$, north lat. $34^{\circ} 40'$.

TRIPOLI, in natural history, the name of an earthy substance which is a species of the tripelas. See the article TRIPELAS. This earth is much used by the lapidaries to polish stones, and by the brasiers, and other the like artists, to clean metalline vessels. It is of two kinds, the yellowish, and reddish-white; the yellowish-white kind is called by authors alana gleba, tripolis and terra tripolirana; this is the produce of Germany, Saxony, and France; there is also of it in the neighbourhood of Venice, but it is found in greatest plenty in many parts of Africa. It is found a dry hard earth of a very pale yellowish-white, of a firm texture, and moderately heavy; it is sometimes found of itself, constituting a stratum; but it is more frequently met with in detached pieces among strata of other matter. It is of a rough, irregular, dusty surface; it adheres slightly to the tongue, is dry, hard, and harsh to the touch, is not to be broken between the fingers, and slightly stains the hands; it makes no effervescence with aqua fortis, and makes a slight hissing noise on being thrown into water. The reddish tripoli is of our own production, though not peculiar to our country; it is found

in great abundance on Mendip-hills in Somersetshire, and not less plentifully in many parts of Germany. This is well known in the shops as a substance of great use in polishing brass, but is not applied to any of the other uses of the yellowish kind: this, like the former, is most frequently found in detached masses, and while in the earth is tolerably soft, and easily falls into flakes. When dry it becomes of a considerable hardness, and is of a fine pale reddish-white; of a loose open texture, composed of a multitude of extremely thin plates or flakes laid evenly on one another, and considerably heavy; it is of a smooth and somewhat glossy surface; it adheres very firmly to the tongue, is dry and harsh to the touch, too hard to be broken between the fingers, and does not stain the hands: it makes no effervescence with acids, and burns to a paler colour, with some additional hardness.

TRIPPING, in heraldry, denotes the quick motion of all sorts of deer, and of some other creatures, represented with one foot as it were on a trot.

TRIPTOTES, *triptota*, in grammar, defective nouns which have only three cases; such is *mele*, *tempe*, *grates*, *prece*, &c.

TRIQUIER, a port-town of France, in the province of Brittany, situated on the english channel, fifty miles west of St. Malo.

TRIQUETROUS, among botanists, expresses a fruit or leaf that has three sides or faces all flat. This leaf is usually subulate, or grows gradually smaller from the base to the point.

TRIREME, or **TRIREMIS**, in antiquity, a gally with three ranks of oars on a side.

TRISECTION, or **TRISSECTION**, the dividing a thing into three. The term is chiefly used in geometry, for the division of an angle into three equal parts. The trisection of an angle geometrically, is one of those great problems whose solution has been so much sought by mathematicians for these two thousand years, being in this respect on a footing with the quadrature of the circle, and the duplication of the cube angle.

TRISMEGISTUS, an epithet or surname given to one of the two Hermeses, or Mercuries, kings of Thebes in Egypt, who is said to be contemporary with Moses.

TRISOLYMPIONICA, among the antients, a person who had thrice borne away the prize at the olympic games;

these had great privileges and honours paid them. See **OLYMPIC-GAMES**.

TRISPAST, *trispaston*, in mechanics, a machine with three pulleys, or an assemblage of three pulleys for raising of great weights. See the article **PULLY**.

TRISYLLABLE, or **TRISSYLLABLE**, in grammar, a word consisting of three syllables.

TRITE, in music, the third musical chord in the system of the antients. See the article **CHORD**.

TRITICEA, the name whereby some authors call the triticum. See the next article.

TRITICUM, in botany, a genus of the triandria-digynia class of plants, the corolla whereof consists of two valves, nearly equal in size, and of the bigness of those of the cup. The exterior valve is bellied with an obtuse end, terminated by a point; the interior valve is plane. The corolla serves instead of a pericarpium, inclosing the seed, which is single, obtuse, and furrowed on one side.

This genus comprehends the common wheat, the spelt-corn, and couch-grass. See the article **WHEAT**, &c.

TRITON, in ichthyology, a genus of fish, the body of which is oblong, the rostrum at the mouth of a spiral form; the tentacula fourteen in number, and twelve of them cheliferous.

TRITON, in poetry, a sea-demi-god, held by the antients to be an officer or trumpeter of Neptune, attending on him, and carrying his orders and commands from sea to sea.

The poets represent him as a half man, half fish, terminating in a dolphin's tail, and bearing in one hand a sea-shell, which serves as a trumpet. Some of the antients make him the Son of Neptune and the nymph Salacia; Hesiod, of Neptune and Amphitrite; Neumenius, in his book de Piscationibus, makes him the son of Oceanus and Tethys; and Lycophron, the son of Nereus. But, though Hesiod and the mythologists only speak of one Triton, the poets have imagined several, giving some of them for trumpeters to all the sea-gods, particularly to Neptune and Venus; accordingly they were frequently introduced on the antient theatres, in the Naumachia.

TRITONE, *tritone*, in music, a false concord consisting of three tones, or a greater third and a greater tone.

Its ratio or proportion in numbers is of 45 to 32. In dividing the octave we

find on one side the false fifth, and the tritone on the other.

The tritone is a kind of redundant fourth, consisting of three tones, whence its name; or more properly of two tones, with a greater semi-tone and a lesser, as of *ut* to *fa*, sharp; of *fa* to *si*, flat, &c. But it is not, as many imagine, a greater fourth, for the fourth is a perfect interval, which does not admit of any majority or minority; nor must the tritone be confounded with the false fifth, for the tritone only comprehends four degrees, *viz.* *ut*, *re*, *mi*, *fa*, sharp; whereas the false fifth comprehends five, *viz.* *fa*, sharp, *sol*, *la*, *si*, *ut*: besides, that among the six semi-tones which compose the tritone chromatically, there are three greater and three lesser; whereas, among the six semi-tones which compose the false fifth, there are only two lesser and four greater.

TRITURATION, *tritura*, in pharmacy, the act of reducing a solid body into a subtile powder; called also levigation and pulverization. See the articles **LEVIGATION** and **PULVERIZATION**.

This is principally employed to reduce hard substances to fine powders, either by the mortar, or by way of levigation on a marble: there is little difficulty in this, besides the labour. Trituration has a great share in some instances, in raising or depressing the efficacy of what comes under its management; for in grinding all those bodies, whose efficacy consists in the peculiar shape and points of their component parts, the more and finer they are broke, the less they will operate: thus may calomel be rendered much gentler, and made capable of being given in much larger quantities, only by long rubbing in a glass mortar; for the continual triture has the same effect upon it, as repeated sublimation, which is only breaking of the saline spicula more and more, until it becomes almost plain mercury. But in resinous substances, particularly those which are purgative, as jalap, scammony, &c. the finer the powder they are reduced into, the greater their efficacy is likely to be. As the sense which the stomach and bowels have of them, is in proportion to their contacts, therefore the more the same quantity is divided, the farther will it diffuse itself, and vellicate the fibres; that is, in other words, it will work the more.

TRITURATION is also used in medicine for the action of the stomach on the food,

whereby it is fitted for nourishment. See the article **DIGESTION**.

TRIVENTO, a town of Italy, in the kingdom of Naples, and principality of Molise, situated fifty-five miles north east of Naples.

TRIUMFETTA, in botany, a genus of the polyandria-digynia class of plants, the corolla of which consists of five linear, erect, obtuse petals, hollowed, deciduous, and bent backwards; the point is prominent below the apex; the fruit is a globose capsule, every where surrounded with hooked prickles, and contains four cells; the seeds are two, convex on one side and angular on the other; but only one of the two seeds of each cell usually ripens.

TRIUMPH, in roman antiquity, a public and solemn honour conferred by the Romans on a victorious general, by allowing him a magnificent entry into the city. The triumph was of two kinds, the lesser, and greater, the first of which is the same with the ovation. See **OVATION**.

The greater triumph, called also *curulis*, or simply the triumph, was decreed by the senate to a general, upon the conquering of a province, or gaining a signal victory. The day appointed for the ceremony being arrived, scaffolds were erected in the forum and circus, and all the other parts of the city, where they could best behold the pomp: the senate went to meet the conqueror without the gate called *capena* or *triumphalis*, and marched back in order to the capitol; the ways being cleared and cleansed by a number of officers and tipstiffs, who drove away such as thronged the passage, or straggled up and down. The general was clad in a rich purple robe, interwoven with figures of gold, setting forth his great exploits; his buskins were beset with pearl, and he wore a crown, which at first was only laurel, but afterwards gold; in one hand he bore a branch of laurel, and in the other a truncheon. He was drawn in a magnificent chariot, adorned with ivory and plates of gold, drawn usually by two white horses; though sometimes by other animals, as that of Pompey, when he triumphed over Africa, by elephants; that of Marc Antony, by lions; that of Heliogabalus, by tygers; that of Aurelian, by deer, &c. His children were at his feet, and sometimes on the chariot-horses. The procession was led up by the musicians, who played triumphal pieces, in praise of the general; these were followed

powers, usually called a pulley. See the article PULLEY.

TROCHLEARES, in anatomy, a name given to the oblique muscles of the eye. See the article OBLIQUUS.

TROCHOID, in geometry, a curve more generally known by the name of cycloid. See the article CYCLOID.

TROCHUS, in the natural history of shell-fish, a name given to several species of the flat-mouthed cochleæ. See COCHLEA. These shells have got the name trochus, from their resembling the figure of the top, with which boys play. See plate CCLXXXV. fig. 4. where n° 1. represents the rough trochus, n° 2. the wavy trochus, and n° 3. the smooth trochus.

TROGLODYTES, in the antient geography, a people of Ethiopia, said to have lived in caves under ground. Pom. Mela gives a strange account of the Troglodytes: he says, they did not so properly speak as shriek, and that they lived on serpents.

TROJA, a town of Italy in the kingdom of Naples, and province of the Capitanate, situated fifty-five miles north-east of Naples.

TROJA, or **TROJAN GAMES**, were games said to be instituted by Ascanius, son of Æneas, and afterwards kept up by the Romans with great solemnity. They were celebrated by companies of boys, neatly dressed, and furnished with little arms and weapons, who mulled in the public circus. They were chosen, for the most part, out of the noblest families of Rome, and the captain of them had the honourable title of princeps juventutis, being sometimes next heir to the empire, and seldom less than the son of a principal senator. A particular account of these games may be seen in the fifth Æneid of Virgil, beginning at verse 345.

TROIS RIVIERES, a town of North America, in the province of Canada, situated on the river of St. Laurence, fifty miles south of Quebec: west long. 75°, and north lat. 46° 45'.

TROKI, a town of Poland, in Lithuania, situated on a lake, fifteen miles west of Wilna: east long. 25°, and north lat. 55°.

TRONAGE, an antient customary toll, paid for weighing of wool. This word is particularly mentioned in a charter granted to the mayor and citizens of London; in which city there is an officer called tronator, whose business it is to weigh the wool that is brought thither.

TRONCONNÉE, in heraldry, denotes a

cross, or other thing, cut in pieces and dismembered, yet so as all the pieces keep up the form of a cross, though set at a small distance from one another.

TRONE WEIGHT, the same with what we now call troy-weight. See WEIGHT.

TROOP, a small body of horse or dragoons, about fifty or sixty, sometimes more, sometimes less; commanded by a captain. Each troop, besides a captain, has a lieutenant, cornet, quarter-master, and three corporals, who are the lowest officers of a troop.

To beat the **TROOP**, is the same as beating the assembly. See ASSEMBLY.

TROPÆOLUM, the **INDIAN CRESS**, in botany, a genus of the octandria-monogynia class of plants, the flower of which consists of five roundish petals inserted into the divisions of the cup; the two upper petals are sessile; the three others have very long and barbated unguis; the fruit consists of three convex capsules, sulcated and striated on one side, and angular on the other; the seeds are three, gibbous on one side, and angulated on the other, but upon the whole somewhat roundish, and striated deeply. See plate CCLXXXV. fig. 3.

This genus comprehends the cardaminum of authors.

TROPE, in rhetoric, a kind of figure of speech, whereby a word is removed from its first and natural signification, and applied with advantage to another thing, which it does not originally mean; but only stands for it, as it has a relation to, or connection with it: as in this sentence, *God is my rock*. Here the trope lies in the word *rock*, which being firm and immoveable, excites in our minds the notion of God's unfailing power, and the steady support which good men receive from their dependence upon him. See the article FIGURE.

Tropes are used for the sake of an agreeable variety; they divert the mind, and revive attention, when it begins to flag and be weary. In many cases there is an absolute necessity for the writer or speaker to repeat the same thing several times; therefore, to prevent the tiresome repetition of the same words, he carefully diversifies his expressions, and judiciously intermixes plain and figurative language. Tropes add a wonderful ornament and strength to a discourse, and often give the mind a brighter and stronger idea of a thing, than proper words: Thus Virgil calling the two Scipios the *thunder*.



Fig. 1. The TIGER-SHELL Fig. 2. TREWIA

Fig. 3. TROPEOLUM



Fig. 4. TROCHUS



Fig. 5. The Speaking TRUMPET

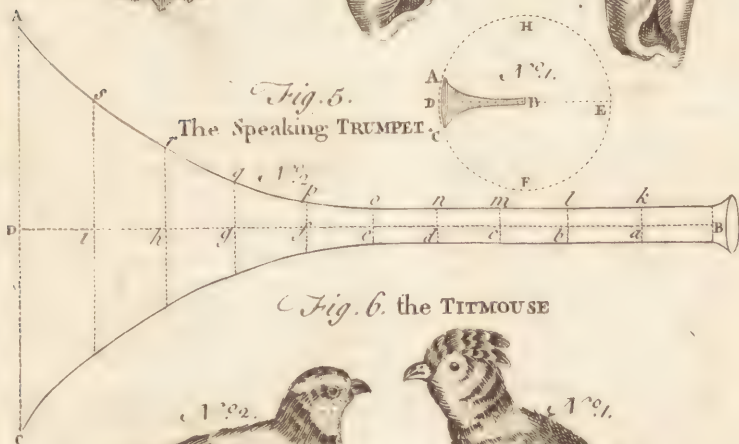


Fig. 6. the TITMOUSE



thunder-bolts of war, represents the rapid speed and victorious progress of their arms more emphatically, than all the plain terms of the roman language could have done. In order to make use of tropes seasonably, and with advantage, the following rules should be observed: 1. Be sparing and cautious in the use of them, and omit them when they are not either as plain as proper words, or more expressive: tropes are the riches of a language, and it will be an imputation upon a man to lavish them away without discretion. 2. Care must be taken, that tropes hold a proportion to the ideas intended to be raised by them; there ought to be an easy and unforced relation betwixt the trope and the proper word it is put for, or the thing intended to be expressed by it: when there is not this suitability and relation, the expression at best will not only be harsh and unpleasant, but often ridiculous and barbarous. In order to preserve this relation, a trope ought not to express more or less than the thing requires; and things capable of heightening or ornament ought not to be debased nor vilified by low expressions; nor small matters over-magnified by pompous and swelling words. 3. A trope ought to be obvious and intelligible, and therefore must not be fetched from things too remote, so as to require much reading and learning to apprehend it.

TROPEA, a town of Italy in the kingdom of Naples, and further Calabria, situated on the Tuscan-sea, forty miles north of Reggio.

TROPEA, a port-town of France, in Provence, situated on the Mediterranean, thirty miles east of Toulon.

TROPHY, *tropæum*, among the antients, a pile or heap of arms of a vanquished enemy, raised by the conqueror in the most eminent part of the field of battle. The trophies were usually dedicated to some of the gods, especially Jupiter. The name of the deity to whom they were inscribed, was generally mentioned, as was that also of the conqueror. The spoils were at first hung upon the trunk of a tree; but instead of trees, succeeding ages erected pillars of stone, or brass, to continue the memory of their victories. To demolish a trophy was looked upon as a kind of sacrilege, because they were all consecrated to some deity.

The representation of a trophy is often to be met with on medals of the roman em-

perors, struck on occasion of victories; wherein, besides arms and spoils, are frequently seen one or two captives by the sides of the trophy.

TROPHY-MONEY, denotes certain money annually raised in the several counties of the kingdom, towards providing harness, and maintaining the militia.

TROPICS, in astronomy and geography, are two circles supposed to be drawn on each side of the equinoctial, and parallel thereto. That on the north-side of the line is called the tropic of cancer, and the southern tropic has the name of capricorn, as passing through the beginning of those signs. They are distant from the equinoctial $23^{\circ} 29'$. Two circles drawn at the same distance from the equator on the terrestrial globe, have the same names in geography, and they include that space or part of the sphere, which is called the torrid zone, because the sun is, at one time or other, perpendicular over every part of that zone, and extremely torrifies or heats it. See the article **ZONE**.

TROPPOAW, a city of Silesia, seventy miles south of Breslaw.

TROT, in the manege, one of the natural paces of a horse performed with two legs in the air, and two on the ground at the same time cross-wise, like St. Andrew's cross, and continuing so alternately to raise the hind-leg of the one side, and the fore-leg of the other side at once, leaving the other hind and fore-leg upon the ground, till the former come down. In this motion, the nearer the horse takes his limbs from the ground, the opener, the evener, and shorter his trot will be. If he takes up his feet slovenly, it is a sign of stumbling and lameness; if he treads narrow or cross, it betokens interfering or failing; if he treads long, it shews over-reaching; if he steps uneven, it bespeaks toil and weariness.

TROVER, in law, an action which a man hath against one that, having found any of his goods, refuseth to deliver them upon demand.

TROUGH of the sea, is the hollow or cavity made between two waves or billows, in a rolling sea.

TROUSSEQUIN, in the manege, an arch of wood raised above the hinder bow of a great saddle, in order to keep the bolsters firm.

TROUT, *trutta*, in ichthyology, the english name of several species of salmo. See the article **SALMO**.

The

The common river-trout is, like the salmon, an inhabitant of the sea or rivers indifferently: it is spotted with red, and its lower jaw is somewhat the largest; its tail is not forked, but hollowed in form of an arch of a circle. It is a very beautiful fish, and is, with justice, greatly esteemed at our tables.

Besides this, there are species of salmo, known by the names of salmon-trout and lake-trout.

For the method of fishing for trout, see the article FISHING.

TROWBRIDGE, a market-town of Wiltshire, eighteen miles north-west of Salisbury.

TROY WEIGHT, in commerce. See the article WEIGHT.

TROYES, a city of Champaign, in France, situated on the river Seyne, seventy-miles south-east of Paris: east long. $4^{\circ} 5'$, and north lat. $48^{\circ} 15'$.

TRUCE, in the art of war, denotes a suspension of arms, or a cessation of hostilities between two armies, in order to settle articles of peace, bury the dead, or the like.

TRUCHMAN, **DRAGOMAN**, or **DROGMAN**, in the countries of the Levant, signifies an interpreter. See **DRAGOMAN**.

TRUCKS, among gunners, round pieces of wood, in form of wheels, fixed on the axle-trees of carriages; to move the ordnance at sea, and sometimes also at land.

TRUE, something agreeable to the reality of things, or to truth.

TRUE place of a planet, or star, in astronomy, is a point of the heavens, shewn or pointed out by a right line, drawn from the center of the earth, through the center of the planet or star. See **PLANET**, &c.

TRUEN, or **TRON**, a town of the bishopric of Liege, in Germany, twenty miles south-east of Louvain.

TRUFFLES, *tubera terræ*, in natural history, a kind of subterraneous vegetable production, not unlike mushrooms, being a genus of fungi, which grows under the surface of the earth. See **FUNGUS**.

The truffle is only a fleshy tubercle, covered with a hard sort of crust, rough, and somewhat regularly furrowed, on the surface almost like the cypress-nut. It does not rise above the surface of the earth, but lies concealed about half a foot below it. Great numbers of them are found in the same place, of different sizes: some of them are now and then found of a pound weight, or even a pound and a quarter; these last are

but rare, and Pliny only mentions their being of a pound weight.

They grow at the feet and under the shade of trees, sometimes about the roots of stones, and sometimes in clear earth. Their favourite trees are either the white or green oak, as the elm is that of the morellæ. They begin to be found when warm weather first succeeds the cold; sooner or later, as the season is more or less mild; for they have sometimes been very rare after hard winters. At first they appear only like little round peas, red without, and white within. These peas grow larger by degrees; from that time they take out of the ground what they commonly call white truffles; these are of themselves insipid, and people dry them as an ingredient for ragouts, because they keep better when dried, than marbled ones do. It is a common opinion, that truffles which have been once removed from their places, are never after capable of being nourished, even when put in some earth from which they were originally taken: but if one leave them there for a certain season, without disturbing them, they grow insensibly larger, their bark becomes black, rough, and unequal, though they always retain their whiteness within. Hitherto they have very little smell or taste, and can only be used in ragouts: these are always called the first white truffles, and are not to be made a different species from the marbled or black ones gathered in the end of autumn, and even in the winter after the frosts are begun.

When the truffles are at maturity, they have a very good smell and taste; and are fit to be dug from the month of October to the end of December; and sometimes to the end of February and March when they are even at that time marbled; whereas those, gathered from the month of April till July and August, are only white. If people neglect to gather the truffles when arrived at a due degree of maturity, they rot; and then we may observe the reproduction of the truffle, because, after some time, we see several bunches of other young truffles filling up the places of the rotten ones. These young truffles are nourished till the first cold comes on; and if the frosts are not intense they get over the winter, and furnish us sometimes with the fresh green truffles. As to the virtues of truffles, the common opinion is, that they are hot: Galeus however, according to Mathiolus, looks upon

upon them as indifferent, and the basis of all other seasoning; and, indeed, it is to this purpose that they are used in all ragouts. Avicenna speaks of them in a manner quite different, and says, they engender thick humours more than any other food; that they are hard of digestion, heavy on the stomach, and, when much used, have a tendency to bring on an apoplexy and palsy. These two authors may be reconciled, if we consider two qualities in the truffle, which are capable of producing two different effects: first they may prove hot of themselves, by emitting their volatile salts into the stomach; or by being mixed with salt, pepper, and other spices, which they drink up like a sponge: In the second place they may prove of hard digestion, when eaten immoderately by a person of a weak stomach: in which case they produce bad effects, stagnate, and form themselves into a glaucous substance, which disorders the stomach, and which may be occasioned by the cold quality ascribed to them by Galen. As a proof that the truffle is of hard digestion, it has this in common with other fruits, that it grows hard in spirit of wine, and is with difficulty dissolved in water.

TRUGILLO, a town of Terra Firma, in South America: west long. $69^{\circ} 30'$, and north lat. $7^{\circ} 16'$.

TRUMPET, a musical instrument, the most noble of all portable ones of the wind kind, used chiefly in war among the cavalry, to direct them in the service.

Marine TRUMPET, is a musical instrument consisting of three tables, which form its triangular body. It has a very long neck, with one single string, very thick, mounted on a bridge, which is firm on one side, but tremulous on the other. It is struck by a bow with one hand, and with the other the string is pressed, or stopped, on the neck by the thumb. It is the trembling of the bridge, when struck, that makes it imitate the sound of a trumpet; which it does to that perfection, that it is scarce possible to distinguish the one from the other: and this is what has given it the denomination of marine trumpet; though, in propriety, it is a kind of monochord.

Harmonical TRUMPET, an instrument that imitates the sound of a trumpet; which it resembles in every thing, excepting that it is longer, and consists of more branches: it is generally called sackbut.

Speaking TRUMPET, is a tube from six to

fifteen feet long, made of tin, perfectly straight, and with a very large aperture; the mouth-piece being big enough to receive both lips.

The speaking-trumpet, or stentorophonic tube, as some call it, is used for magnifying of sound, particularly that of speech, and thus causing it to be heard at a great distance: how it does this, will be easy to understand from the structure thereof, thus illustrated by the ingenious Mr. Martin: let ABC (pl. CCLXXXV. fig. 5. n^o 1.) be the tube, BD the axis, and B the mouth-piece for conveying the voice to the tube.

Then it is evident, when a person speaks at B, in the trumpet, the whole force of his voice is spent upon the air contained in the tube, which will be agitated thro' the whole length of the tube; and by various reflections from the side of the tube to the axis, the air along the middle-part of the tube will be greatly condensed, and its momentum proportionably increased; so that, when it comes to agitate the air at the orifice of the tube AC, its force will be as much greater than what it would have been without the tube, as the surface of a sphere, whose radius is equal to the length of the tube, is greater than the surface of the segment of such a sphere, whose base is the orifice of the tube. See the article SOUND.

For a person speaking at B, without the tube, will have the force of his voice spent in exciting concentric superficies of air all around the point B; and, when those superficies or pulses of air are diffused as far as D, every way, it is plain the force of the voice will be diffused through the whole superficies of a sphere whose radius is BD; but in the trumpet it will be so confined, that, at its exit, it will be only diffused thro' so much of that spherical surface of air, as corresponds to the orifice of the tube. But, since the force is given, its intensity will be always inversely, as the number of particles it has to move; and therefore, in the tube, it will be to that without, as the superficies of such a sphere to the area of the large end of the tube, nearly.

To make this matter yet plainer by calculation, let $BD = 5$ feet, then will the diameter of the sphere $DE = 10$ feet, the square of which is 100, which, multiplied by 0,7854, gives 78,54 square feet for the area of a great circle AHEFC. And, therefore, four times that area, viz. $4 \times 78,54 = 314,16 =$ square feet in the superficies

superficies of the aerial sphere. If now the diameter AC, of the end of a trumpet, be one foot, its area will be 0,7854; but 7854 : 314,16 :: 1 : 400, therefore the air at the distance of BD, will be agitated by means of the trumpet, with a force 400 times greater than by the bare voice alone. Again, it is farther evident how instruments of this form assist the hearing greatly; for the weak and languid pulses of the air being received by the large end of the tube, and greatly multiplied and condensed by the tremulous motion of the parts of the tube, and air agitated by them, are conveyed to the ear by the small end, and strike it with an impetus as much greater than they would have done without it, as the area of the small end at B, is less than the area of the large end AC. From what has been said, it is evident the effect of the tube in magnifying sound, either for speaking or hearing, depends chiefly upon the length of the tube. But yet some advantage may be derived from the particular shape thereof. Some very eminent philosophers have proposed the figure which is made by the revolution of a parabola about its axis, as the best of any, where the mouth-piece of the parabola, and, consequently, the sonorous rays, will be reflected parallel to the axis of the tube.

But this parallel reflection seems no way essential to the magnifying of sound; on the contrary, it appears rather to hinder such an effect, by preventing the infinite number of reflections and reciprocations of sound; in which, according to Sir Isaac Newton, its augmentation doth principally consist. For all reciprocal motion, in every return, is augmented by its generating cause, which is here the tremulous motions of the parts of the tube. Therefore, in every repercussion from the sides of the tube, the agitations and pulses of confined air must necessarily be increased; and consequently, this augmentation of the impetus of the pulses must be proportional to the number of such repercussions; and, therefore, to the length of the tube, and to such a figure as is most productive of them. Whence it appears, that the parabolic trumpet is, of all others, the most unfit for this purpose, instead of being the best.

But there is one thing more which contributes to the augmenting of these agitations of air in the tube, and that is the proportion which the several portions of

air bear to each other, when divided by transverse sections, at very small, but equal distances, from one end of the tube to the other. Thus, let those several divisions be made at the points *a, b, c, d, e, &c.* (*ibid.* n°. 2.) in which let the right lines *a k, b l, c m, d n, &c.* be taken in geometrical proportion. Then will the portions of air contained between B and *a, a and b, b and c, c and d, &c.* be very nearly in the same proportion, as being in the same ratio with their bases, when the points of division are indefinitely near together.

But, when any quantity of motion is communicated to a series of elastic bodies, it will receive the greatest augmentation when those bodies are in geometrical proportion. Therefore, since the force of the voice is impressed upon, and gradually propagated through, a series of elastic portions of air in a geometrical ratio to each other, it shall receive the greatest augmentation possible.

Now, since by construction it is $Ba = ab = bc = cd, &c.$ and also $ak : bl :: bl : cm :: cm : dn$, and so on; therefore, the points *k, l, m, n, o, p, q, r, s, A,* will, in this case, form that curve line, which is called the logarithmic curve; consequently, a trumpet, formed by the revolution of this curve about its axis, will augment the sound in a greater degree than any other figured tube whatever.

Listening, or Hearing TRUMPET, an instrument to assist hearing. See the article HEARING.

TRUMPET-FLOWER, *bignonia*, in botany. See the article BIGNONIA.

TRUMPET-SHELL, the english name of the buccinum of authors. See the article BUCCINUM.

TRUNCATED, in general, is an appellation given to such things as have, or seem to have, their points cut off: thus we say, a truncated cone, pyramid, leaf, &c. See CONE, PYRAMID, &c.

TRUNCHEON, a short staff, or battoon, used by kings, generals, and great officers, as a mark of their command.

TRUNDLE, a sort of carriage with low wheels, whereon heavy and cumbersome burdens are drawn.

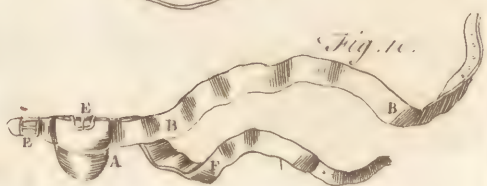
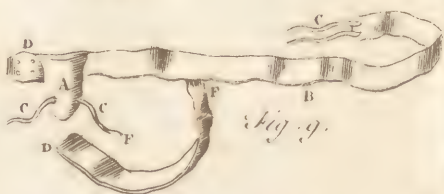
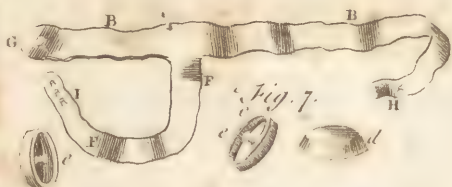
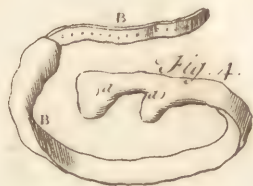
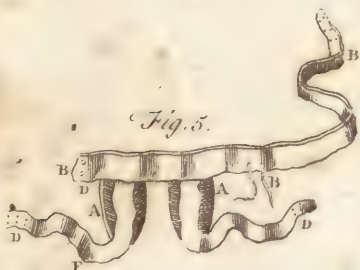
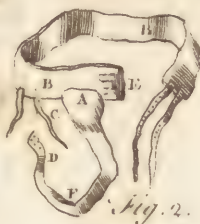
TRUNDLE-SHOT. See the article SHOT.

TRUNK, *truncus*, among botanists, denotes the stem, or body, of a tree; or, that part between the ground and the place where it divides into branches.

In anatomy, trunk is used for the bust of a human body, exclusive of the head



TRUSSES



and limbs, comprehending the abdomen and thorax. See the article **ABDOMEN** and **THORAX**.

Trunk is also used for the main body of an artery, or vein, in contradistinction to the branches and ramifications thereof.

Trunk-roots of a plant, are little roots which grow out of the trunks of plants.

These are of two kinds : 1. Such as vegetate by a direct descent, the place of their eruption being sometimes all along the trunk, as in mints, &c. and sometimes only in the utmost point, as in brambles.

2. Such as neither ascend nor descend, but shoot forth at right angles to the trunk; which therefore, though as to their office they are true roots, yet, as to their nature, are a medium between a trunk and a root.

TRUNNIONS, or **TRUNIONS** of a piece of ordnance, are those knobs or bunches of the gun's metal, which bear her up on the cheeks of the carriage: and hence the trunnion-ring is the ring about a cannon, next before the trunnions.

TRURO, a borough of Cornwall, situated thirty-two miles north-east of the Land's-end.

It sends two members to parliament:

TRUSS, *truffa*, a bundle, or certain quantity of hay, straw, &c.

A truss of hay is to contain fifty-six pounds, or half an hundred weight; thirty-six trusses make a load. In June and August the truss is to weigh sixty pounds, on forfeiture of eighteen shillings per truss.

A truss of forage is as much as a trooper can carry on his horse's crupper.

TRUSS of flowers, is used, by florists, to signify many flowers growing together on the head of a stalk, as in the cowslip, auricula, &c.

TRUSS is also used for a sort of bandage or ligature, made of steel, or the like matter, wherewith to keep up the parts, in those who have hernias or ruptures. See the article **HERNIA**.

In plate **CCLXXXVI**. are represented various kinds of trusses, to compress the parts, and prevent a relapse of the intestine after the rupture has been cured. Some of these, as fig. 2, 8, and 9, are made of calicoe, for infants; or of leather, for adults. Others, as fig. 1, 3, 4, and 11, are made of steel covered with leather. Some are made of steel-plates, joined by hinges, so as to be flexible and

more easy, as in fig. 11. Some again are designed for ruptures on both sides; as fig. 4 and 5. Some are for ruptures on the right side, as fig. 2 and 3: others for the left; as 1, 9, 10, and 11. Some, again, are fastened to the body by tagged-laces; as fig. 5, 6, and 9: others by straps and buckles; as fig. 2, 5, and 9: others by hooks and eyes, or hooks and straps; as fig. 1, 3, 4, and 11: and others again by different contrivances; as in fig. 7 and 8.

In all these trusses, **A** denotes the bolster or compress, which is applied to the ring of the abdominal muscles, after the rupture has been reduced: **BB** the girdle or belt of the truss, to be fastened round the body, either with strings **CC**, passed through the holes **DD**; or by straps and buckles; as in fig. 2 and 10, marked **EE**: or with hooks, as in fig. 1, 3, 4, and 11, marked **aa**. In many of these trusses there is a depending girt, besides that which passes round the body, which is to be passed between the legs of women, and fastened to the opposite part of the belt: as **FF** in fig. 1, 2, 6, 7, 8, 9, and 10. In fig. 6 is shewn the bolster **a**; and in fig. 7 may be seen a wooden bolster **cd**, **ee** being the button by which it is fastened to the truss, and **d** the convex part by which it is applied to the rupture.

There are a multitude of other trusses; of various forms, contrived by those who make it their business; but we have here given figures of the best of them, from Heister's surgery, P. II. p. 71 and 72.

TRUSSES, in a ship are ropes made fast to the parrels of a yard, either to bind the yard to the mast when the ship rolls, or to hale down the yards in a storm, &c.

TRUSSING, in falconry, is a hawk's raising any fowl, or prey, aloft; first soaring up, and then descending with it to the ground.

TRUST, in law, signifies, in general, that confidence which one person reposes in another; and in case of non-performance, or breach of this trust, the remedy is by bill in equity, as the common-law usually takes no notice of trusts.

Conveyances made in the way of trust, which were formerly invented to evade the statute of uses, are not so much favoured as plain and direct deeds. All declarations of trusts of lands, &c. are to be in writing, and signed by the parties. It has been decreed in chancery, that a fine and recovery of a cestui qui

trust shall bar and transfer the estate, as they should an estate at-law, where the same were levied or suffered on good consideration. And there is a statute whereby an infant seised of an estate in fee in trust, is enabled to make any conveyance thereof, by order of the court of chancery.

TRUSTEE, one who has an estate, or money, put or trusted in his hands, for the use of another.

Where two or more persons are appointed trustees, if one of them only receives all or the greatest part of the profits of the lands, &c. and is in arrear, and unable to satisfy the person to whom he is seised in trust, the other, in that case, shall not be answerable for more than comes to his hands.

TRUTH, *veritas*, a term used in opposition to falsehood, and applied to propositions which answer, or accord, to the nature and reality of the thing whereof something is affirmed or denied.

Truth, according to Mr. Locke, consists in the joining or separating of signs, as the things signified by them do agree or disagree one with another. Now the joining or separating of signs is what we call making of propositions. Truth then, properly, relates only to propositions; whereof there are two sorts, mental and verbal; as there are two sorts of signs commonly made use of, *viz.* ideas and words. See **IDEA**; **WORD**, &c. Mental propositions are those wherein the ideas in our understanding are put together, or separated, by the mind perceiving or judging of their agreement or disagreement.

Verbal propositions are words put together, or separated, in affirmative or negative sentences: so that a proposition consists in joining or separating of signs; and truth consists in putting together, or separating those signs, according as the things they stand for agree or disagree. See **PROPOSITION**.

Moral TRUTH, consists in speaking things according to the persuasion of our minds, and is called also veracity.

Metaphysical, or transcendental TRUTH, is nothing but the real existence of things conformable to the ideas which we have annexed to their names.

TRUTINATION, the act of weighing or balancing a thing. See the article **BALANCE**.

TRUXILLO, a town of Estremadura, in Spain, one hundred miles south-west

of Toledo: west long. 6°, north lat. 39° 12'.

TRUXILLO is also a town of Terra-Firma, situated in west long. 69°, and north lat. 9° 15'.

TRUXILLO is likewise a port-town of Mexico, situated on the gulph of Honduras: west long. 88° 30', north lat. 15° 30'.

TRY, in the sea-language. A ship is said to try, or lie a-try, when no sails are abroad but the main-sail or mizzen-sail.

TUB, in commerce, denotes an indeterminate quantity or measure: thus, a tub of tea contains about sixty pounds; and a tub of camphor from fifty-six to eighty pounds.

TUBE, *tubus*, in general, pipe, conduit, or canal; a cylinder hollow within, either of lead, iron, wood, glass, or other matter, for the air, or some other fluid, to have a free passage, or conveyance, through. See the article **PIPE**, &c.

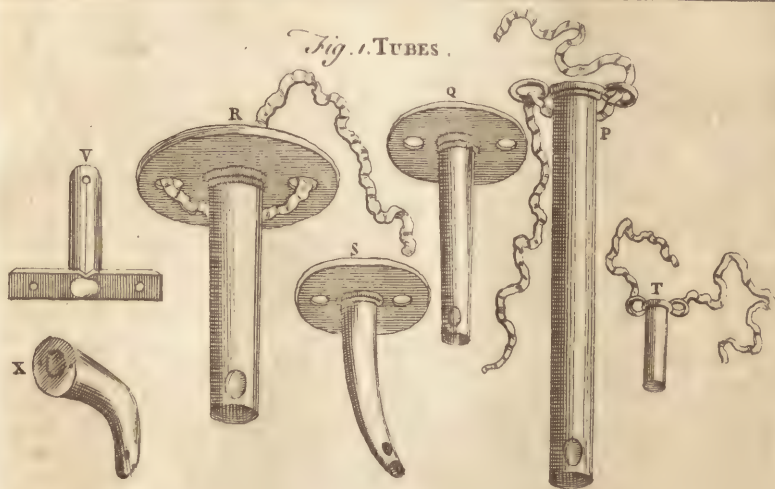
Small silver or leaden tubes are frequently used, by surgeons, to draw off blood, matter, or water, from the different parts of the body: they are made of various sizes and shapes, as represented in plate CCLXXXVII. fig. 1. at the letters P, Q, R, S, T, V, X; the uses of which will be shewn more at large under the articles **WOUND**, **PARACENTESIS**, &c.

TUBE, in astronomy, is sometimes used for a telescope, or more properly, for that part thereof into which the lenses are fitted, and by which they are directed and used. The goodness of the tube being of great importance to that of the telescope, we shall here add its structure.

The construction of a draw TUBE, for a telescope. The chief points to be regarded here are, that the tube be not troublesome by its weight, nor liable to warp and disturb the position of the glasses; so that every kind of tube will not serve in every case. See the article **TELESCOPE**.

1. If the tube be small, it is best made of thin brass-plates covered with tin, and formed into pipes or draws, to slide within one another.

2. For long tubes, iron would be too heavy, for which reason some chuse to make them of paper, thus: A wooden cylinder is turned, of the length of the paper to be used, and of a diameter equal to that of the smallest draw; about this cylinder is rolled paper till it be of a sufficient thickness; when one pipe is dry provide others after the same manner, still making the last serve for a mould to the

Fig. 1. TUBES.*Fig. 2. TULIP.*



the next, till you have enough for the length of the tube desired. Lastly, to the extremes of the draws are to be glued wooden ferrils, that they may be drawn forth the better.

3. Since paper draws are apt to swell with moist weather, so as to spoil their sliding; and in dry weather to shrink, which renders them loose and tottering; in both which cases the situation of the lens is easily disturbed; the best method of making of tubes is as follows: Glue parchment round a wooden cylinder, and let the parchment be coloured black, to prevent the reflecting rays making any confusion: provide very thin slits of beech, and bending them into a cylinder glue them carefully to the parchment; cover this wooden case with white parchment, and, about its outer extreme, make a little ring or ferril: after the same manner, make another draw over the former, and then another, till you have enough for the length of the tube.

To the inner extremes of each draw fit a wooden ferril, that the spurious rays, striking against the sides, may be intercepted and lost. In these places where the lenses are to be put, it will be proper to furnish the ferrils with female screws. Provide a wooden cover to defend the object glass from the dust; and, putting the eye-glass in its wooden ferril, fasten it by the screw to the tube. Lastly, provide a little wooden tube of a length equal to the distance the eye-glass is to be from the eye, and fit it to the other extreme of the tube.

TUBE-FISH, the *TRIGLA* with a prickly-head, and with three appendages at each of the pectoral fins. See *TRIGLA*.

TUBER, or **TUBERCLE**, in botany, a kind of round turgid root, in form of a knob or turnip.

The plants which produce such roots are hence denominated tuberose, or tuberous, plants.

TUBER, or **TUBEROSITY**, in medicine, is used for a knob, or tumour, growing naturally in any part; in opposition to tumours, which arise accidentally, or from disease.

TUBERA TERRÆ, **TRUFFLES**, in botany. See the article **TRUFFLES**.

TUBERCLES, among physicians, denote little tumours which suppurate and discharge pus, and are often found in the lungs, especially of consumptive persons. See **CONSUMPTION** and **PHTHISIS**.

TUBEROUS, or **TUBEROSE-ROOTS**, in botany. See the article **TUBER**.

TUBINGEN, a city of Swabia, in Germany, situated on the river Neckar, in the dutchy of Wirtemberg: east long. 8° 55', north lat. 48° 26'.

TUBIPORA, or **TUBULARIA**, a genus of submarine plants, belonging to the cryptogamia class, of the hardness of coral, and consisting of cylindric tubes rising from a thin crust of the same sort of matter with themselves.

TUBULARIA FOSSILIS, in natural history, the name of a species of coral found very often fossil in Germany and Italy, and composed of a great number of tubes, or longitudinal pipes, often resembling so many worms ranged perpendicularly in the mass. They are usually found either in masses of a lax stone, or in single tubules in those of the harder and firmer texture. In these two states, this fossil makes two very different appearances; and, according to the different directions in the mass, or the different views of them that the sections of it place them in, they make a number of very elegant figures.

TUBULI FOSSILIS, in natural history, the tubules, or cases of sea-worms, found buried in the earth. They are met with of various sizes, sometimes complete, and buried in the strata of earth or stone; sometimes they are more or less perfect, and are immersed in masses of the *ludus helmontii* or *septariæ*, and in this state they make one kind of *lapis syringoides*, or pipe-stone; but the most beautiful *syringoides*, or pipe-stones, are the parts of the bottoms of ships, or posts fixed in the sea, which have been pierced, in their original state of wood, by these sea-worms, and afterwards petrified with the cases or tubuli of the worms remaining in them; these are usually of a pale-yellow or whitish-wax colour, and the body of the mass of a brownish or blackish hue, but retaining the structure of the wood: of these there are beautiful specimens in great abundance on the shore of the island Sheppy. We have the very same substances also buried in our clay-pits, about London and at Richmond; but in these the wood is highly saturated with the matter of the common vitriolic pyrites, and the pipes often filled with the same substance. See **SYRINGOIDES**.

TUBULI LACTIFERI, in anatomy, the small tubes, or vessels, through which
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the milk flows to the nipples of women's breasts. See the article MILK.

TUBULUS MARINUS, or **CANALIS**, in natural-history, a genus of univalve shells, of an oblong figure, terminating in a point, and hollow within, so as to resemble a tube or horn; and hence have, by some old writers, been called dentalia. See **DENTALIA**.

Of these shells some are striated, some straight, some bent like a horn, and some in form of a crescent.

TUCANA, the **TOUCAN**, in ornithology. See the article **TOUCAN**.

TUCK of a ship, the trussing or gathering up the quarter under water; which if she lie deep, makes her have a broad, or, as they call it, fat quarter, and hinders her steering, by keeping the water from passing swiftly to her rudder; and if this trussing lie too high above the water, she will want bearing for her works behind, unless her quarter be very well laid out.

TUCUMAN, the south-west division of the province of La Plata, or Paraguay, in South America.

TUCUYO, a town of Terra-Firma: west long. $68^{\circ} 30'$, north lat. 7° .

TUDELA, a town of Navarre, in Spain, situated on the river Ebro, fifty-five miles south of **PAMPELUNA**.

TULIP, *tulipa*, in botany, a genus of the hexandria-monogynia class of plants, with a campanulated flower, consisting of six oblong, hollow, and erect petals: the fruit is a triquetrous, and trilocular capsule, containing a great many flat seeds ranged in a double order. See plate **CCLXXXVII**, fig. 2.

The characters of a good tulip are, that the stem should be strong and tall; the flower should consist of six petals, three within and three without; and the former should be larger than the latter: the bottom of the flower should be proportioned to the top, and the ends of the leaves should be rounded, not pointed: the leaves, when opened, should neither turn inward nor bend outward, but stand erect; and the whole flower should be of a middling size, neither too large nor too small: the stripes must be small and regular, and should all arise from the bottom of the flower: the chives also should not be yellow but of a brown colour.

TULIP-TREE, *liriodendrum*, in botany. See the article **LIRIODENDRUM**.

TULLE, a town of France, in the pro-

vince of Guienne: east long. $1^{\circ} 32'$, north lat. $45^{\circ} 23'$.

TULN, a town of Germany, fifteen miles west of Vienna.

TUMEFACATION, the act of swelling or rising into a tumour. See the next article.

TUMOUR, or **TUMOR**, in medicine and surgery, a preternatural rising or eminence on any part of the body. Tumour is also defined, by physicians, a solution of continuity arising from some humour collected in a certain part of the body, which disjoins the continuous parts, insinuates itself between them, and destroys their proper form.

Whether there be any such preternatural rising or enlargement on any part of the body, may be discovered from inspection, but more particularly by feeling. And, notwithstanding, it is a general custom to refer excrescences, as warts, corns, and such as grow in the nose and pudentia, to the class of tumours; yet, because they grow not from beneath, but out of, or upon, the skin itself, it is thought proper not to comprehend them in the general division of tumours. See **EXCRESCENCE**, **CORN**, **WART**, &c.

There are tumours of various kinds, distinguished by particular names, according to the different causes from whence they proceed, and the particular parts wherein they are seated; some are called hot, others cold and watry; some are termed windy, others scirrhus; and some are named benign, others malignant: but Heister finds fault with these distinctions. There are some tumours which being contained in a proper membrane, are therefore called cystic; and if this should be in an artery, it is usually termed aneurism; but when in a vein, a varix. When in the veins of the anus, or rectum, the disorder is termed hæmorrhoids; but if the tumour be in the scrotum, unguen, or at the umbilicus, it is generally called a hernia: if any pus, or matter, is contained in the tumour, it is called an abscess; and if the tumour is seated in a bone, it is termed exostosis. See the articles **CYST**, **ANEURISM**, **VARIX**, **HÆMORRHOIDS**, **HERNIA**, **ABSCCESS**, and **EXOSTOSIS**.

The forementioned class of tumours are all of them subdivided into several other kinds: thus the hot and burning tumours, which are the same with inflammations, are generally termed phlegmons when violent and seated in the common

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Integuments; but when lighter, they are commonly called **furuncles**. The inflammation which is not fixed deep, but spreads only superficially upon the skin, is termed an **erysipelas**: the inflammatory tumour that arises at the finger-ends is termed **paronychia**: that which fixes in the groin or armpits is called a **bubo**; and that under the ears a **parotis**. When an inflammation seizes the hands and feet from extreme cold, chilblains arise; which tumour is called **pernio**. See the articles **INFLAMMATION**, **FURUNCLE**, **ERYSIPELAS**, **PARONYCHIA**, **BUBO**, **PAROTIDES**, and **PERNIONES**.

TUMOURS of the breasts. See the article **INFLAMMATIONS of the breasts**.

Cancerous TUMOURS. See **CANCER**.

Encysted TUMOURS, tumours arising in different parts of the body, but contained in certain membranous coats: these are sometimes harder, sometimes softer, of a palish colour, and usually attended with little pain. These tumours arise from obstructions either in the glands, or in the adipose membrane, more especially about the face and neck, where they occasion great deformity. The membranous coat with which these tumours are invested, is often of a considerable thickness, and is usually the coat of the disordered gland, or some of the adipose cells. At their beginning they are usually very small and moveable; but encroaching by slow degrees, they grow sometimes to an enormous bulk. See the article **CYST**.

The consistence of some of these tumours is soft and fluctuating, and of others more hard and firm. They are of all shapes and sizes, and some of them become hard as a callus, and unmoveable, while others are, for the generality, soft and moveable. See **CALLUS**.

They are distinguished according to the consistence of their contents; some are called **atheromata**, from their contents resembling paste; others, which have them of the consistence of honey, are called **meliceræ**; but if they are of a fatty substance, like suet or lard, they are called **steatomata**. If they happen in a gland which becomes indurated, they are called **schirrous**: and lastly, when they are of a fleshy consistence, they are called **sarcomata**. Some of these tumours have been found also full of hair. See **ATHEROMA**, &c.

They are distinguished by others according to the places where they are situated.

Those seated under the scalp are called **talpa**, **testudo**, or **lupia**. Those in the neck, **strumæ** or **scrophulæ**; and those in the hands and feet, especially if among the tendons, are called **ganglions**. See the article **GANGLIO**, &c.

There is no general method for the cure of them; but the surgeon, according to their different circumstances, attempts this by discussion, suppuration, or extirpation. See the articles **DISPERSION** and **SUPPURATION**.

But if the tumour can neither be dispersed nor suppurated, but continues to enlarge itself, it is adviseable to extirpate it in order to prevent its turning into a cancerous nature. There are several methods in practice for extirpating these tumours according to their nature and size: those which are small and hard, or hung by a root as by a stalk, are generally best removed by ligature, in the manner of warts; by which means they wither and fall off of themselves in a few days. But the most ready and expeditious method is to cut them off with a scalpel, and then heal up the wound: but if in removing them this way you divide a considerable artery, you may stop it by some potential, or even the actual, cautery; or else, by taking it up with a needle and thread. Lastly, these tumours may be often removed by the application of caustic or corroding medicines, retained about the root by means of plasters, compresses, and a bandage; and when you find the root of the tumour almost corroded through, the rest may be divided by the scalpel. See the article **CAUSTIC**.

If the root of the encysted tumour appears too large for it to be conveniently taken off by ligature, you must then remove it either by the knife or by the caustics, though the latter is usually preferred. In order to extirpate it by the knife, you must first make a longitudinal incision upon the tumour; and if that does not appear sufficient, make another incision across the former, till you think the wound large enough for taking out the tumour; in order to which you next dilate the integuments, and separate them from the cyst of the tumour, which you are to take out whole, if possible, either by means of the scalpel, a hook, or by passing a crooked needle, with a strong thread, crosswise under the tumour; but great caution is necessary in this operation, lest any important part that is contiguous to the tumour be injured.

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The tumour being thus carefully extracted, if the wound and hæmorrhage be small you may press the lips together; and by covering the same with lint and compresses, retained with a proper bandage, the patient is cured in a few days time; but in case of a profuse hæmorrhage the blood is to be stopped either by ligature, astringents, or the actual or potential cautery.

Fungous TUMOURS. See FUNGUS.

Inflammatory TUMOURS. See the article INFLAMMATION.

Oedematous TUMOURS. See OEDEMA.

TUMOURS of the parotid glands. See the article PAROTIDES.

Pestilential TUMOURS. See the articles BUBO and CARUNCLE.

Scirrhus TUMOURS. See SCIRRHOUS.

TUMOURS of the testicles. See TESTICLES.

TUN, or **TON**, originally signifies a large vessel or cask of an oblong form, biggest in the middle, and diminishing towards its two ends, girt about with hoops, and used for stowing several kinds of merchandize, for convenience of carriage; as brandy, oil, sugar, skins, hats, &c. This word is also used for certain vessels of extraordinary bigness, serving to keep wine in for several years.

TUN is also a certain measure for liquids; as wine, oil, &c. See MEASURE.

TUN is also a certain weight whereby the burden of ships, &c. are estimated. See the article WEIGHT.

TUNA, in botany, the same with the cactus. See the article CACTUS.

TUNBRIDGE, a town of Kent, situated thirty-three miles west of Canterbury, much resorted to on account of its excellent waters.

TUNE, or **TONE**, in music, that property of sounds whereby they come under the relation of acute and grave to one another. See the articles ACUTENESS, GRAVITY, TONE, and SOUND.

Though gravity and acuteness are mere terms of relation, the tune of the sound is something absolute, every sound having its own proper tone, which must be under some determinate measure in the nature of the thing.

The only difference then, between one tune and another is in the degrees.

If two or more sounds be compared together in this relation, they are either equal or unequal in the degree of tune.

Such as are equal are called unisons.

The unequal constitute what we call an

interval, which is the difference of time between two sounds.

Sonorous bodies we find differ in tune:

1. According to the different kinds of matter; thus a wedge of silver sounds much more acute than a wedge of gold of the same shape and dimensions, in which case the tones are proportional to the specific gravity. 2. According to the different quantities of the same matter in bodies of the same figure, a solid sphere of brass, one foot diameter, sounds acuter than one of two feet diameter; in which case the tunes are proportional to the quantity of matter. Here then are different tunes connected with different specific gravities and quantities of matter, as their immediate cause. In effect, the measures of tune are only sought in the relations of the motions that are the cause of sound, which are no way so discernable as in vibrations of chords. See the article CHORD.

In the general we find that, in two chords, all things being equal, except tension, or thickness, or length, the tunes are different; there must, therefore, be a difference in the vibrations owing to these different tensions, &c. which difference can only be in the velocity of the courses and recourses of the chords, through the spaces wherein they move to and again. Now, upon examining the proportion of the velocity and the things just mentioned, wherein it depends, it is found, to a demonstration, that all the vibrations of the same chord are performed in equal times. Hence, as the tone of a sound depends on the nature of those vibrations, whose difference we can conceive no otherwise than as having different velocities; and as the small vibrations of the same chord are performed in equal times, and it is found true, in fact, that the sound of any body, arising from any individual stroke, tho' it grow gradually weaker, yet continues the same tone from first to last: it follows, that the tone is necessarily connected with a certain quantity of time, in making every single vibration; or, that a certain number of vibrations, accomplished in a given time, constitutes a certain determinate tune; for the more frequent those vibrations are, the more acute the tone; and, the slower and fewer they are, the more grave the sound, though performed in the same space of time; so that any given note of a tune is made by one

one certain measure of velocity of vibrations, *i. e.* such certain courses and recourses of a chord or string, in such a certain space of time, constitute a determinate tune. See the article **NOTE**.

This theory is strongly supported by our best and latest writers on music, Dr. Holder, Mr. Malcolm, &c. both from reason and experience. Dr. Wallis, who holds it very reasonable, adds that it is evident the degrees of acuteness are reciprocally as the lengths of the chords, though, he says, he will not positively affirm that the degrees of acuteness answer the number of vibrations as their true cause: but this difference arises hence, that he doubts whether the thing has been sufficiently proved by experiment. Indeed, whether the different number of vibrations, in a given time, is the true cause on the part of the object of our perceiving a difference of tune, is a thing which, we conceive, does not come within the reach of experiment. It is enough that the hypothesis is reasonable. See the articles **CONCORD**, **HARMONY**, &c.

TUNICA, a kind of waistcoat, or undergarment, in use amongst the Romans. They wore it within doors by itself, and abroad under the gown. The common people could not afford the toga, and so went in their tunics, whence Horace calls them *popellus tunicatus*. The several sorts of the tunic were the *palmata*, the *angusticlavia*, and the *laticlavia*. The first was worn by generals in a triumph, and perhaps always under the *toga picta*; it had its name either from the great breadth of the clavi, equal to the palm of the hand; or else from the figures of palms, embroidered on it. For the other two, see the article **CLAVUS**.

It was by these three different sorts of tunics, that the three different orders of the roman people were distinguished in habit.

TUNICA, *tunic*, in anatomy, is applied to the membranes which invest the vessels, and divers others of the less solid parts of the body; thus the intestines are formed of five tunics, or coats, for which see the article **INTESTINES**.

There are also five tunics, or coats, of the eye, for which see the article **EYE**.

TUNIS, the capital of the kingdom of Tunis, thirty miles south of Carthage-rains, 200 miles east of Algiers, and 120 south-west of Trapano, in Sicily; a populous city, about three miles in circumference: east long. 10° north lat. 36°

20'. The kingdom of Tunis is situated on the coast of Barbary, in Africa, being bounded by the Mediterranean Sea, on the north. It extends 200 miles in length from east to west, along the shore of the Mediterranean; the breadth is very unequal.

TUNNAGE is used for a custom or impost, payable to the crown, for goods and merchandize imported or exported, and is to be paid after a certain rate for every tun thereof. This duty, as well as that of poundage, was first granted for life to king Charles II. and has been continued in the same manner to his royal successors, down to his present majesty king George III.

TUNNEL-NET, a net for taking partridges, which should not exceed fifteen feet in length, nor be less than eighteen inches in breadth, or opening for the entrance. See the article **NET**.

When you have found a covey, fetch a compass and pitch the net at a good distance from them, sometimes farther, at other times nearer, according to the situation of the ground; surround them either with a natural or artificial stalking horse, and gently drive them towards the net, not coming on them in a direct line, but by turnings and windings, and sometimes standing still, as if the horse grazed. In case they make a stand and look up, it is a sign of fear, and that they intend to take wing; stand still therefore, or retreat for a while, and when you find them quiet after a little respite, and busy in seeking after meat, you are to move nearer, and if any single partridge lies remote from the rest, he may be brought in by fetching a compass about him. The wing of the tunnel must not be pitched in a direct line, but inclining to a semi-circle. See **STALKING**.

TUNNING of ale or beer, a part of the process of brewing, or rather an operation which is the sequel thereof. When the beer has worked or fermented in an open vat, as long as is proper, tun it up into seasoned vessels, that is, such as have had ale or beer in them before; for if it be put into new casks, it must be made stronger than ordinary, else it will not keep so long, because the cask will imbibe the spirits, and the rest will soon become flat and vapid. It is best to run beer just when it comes to a due fermentation, and gets a good head; for then it has the most strength to clear itself in the cask, and what works over may be put into the

the small beer, and must be supplied with fresh beer of the same brewing. When the beer is tunned, carry it while it works in the cask, into a good cellar, or proper place to preserve it; for if it be stirred after it has done working, it will be apt to grow stale, sour, and become alear, unless it be drawn out into another cask.

TUNNY, *thynnus*, in ichthyology, the scomber, with eight or nine pinnules on the hinder part of the back, and a furrow at the belly fins. See **SCOMBER**.

TURBAN, or **TURBANT**, the head-dress of most of the eastern nations. It consists of two parts, a cap, and a sash of fine linnen, or taffety, artfully wound in divers plaits about the cap. The Turks call the sash turbent, whence we have formed turban. The cap has no brim, is pretty flat, though roundish at top, and quilted with cotton, but does not cover the ears. There is a good deal of art in giving the turban a fine air, and the making of them is a particular trade. The sash of the Turks turban is white linnen; that of the Persians red woollen. These are the distinguishing marks of their different religions. Sophi, king of Persia, being of the sect of Ali, was the first who assumed the last colour, to distinguish himself from the Turks, who are of the sect of Omar, and whom the Persians esteem heretics. The Emirs, who pretend to be descended of the race of Mahomet, wear their turbans quite green, which was the colour wore by that false prophet. The grand seignior's turban is as big as a bushel, and so exceedingly respected by the Turks, that they scarce dare touch it. It is adorned with three plumes of feathers, enriched with diamonds and precious stones, and he has an officer on purpose to look after it. The grand vizier's turban has two plumes; so have those of divers other officers, only smaller one than another; others have only one, and others none at all. The turban of the officers of the divan is of a peculiar form.

TURBAN-SHELL, in conchyliology, the english name of the roundish centronia. See the article **CENTRONIA**.

TURBARY, denotes a right to dig turfs on another's ground; and it is likewise taken for the ground or place where turfs are digged, sometimes called the turfary.

TURBINATED, is a term applied by naturalists, to shells, which are spiral, or

wreathed, conically, from a larger basis to a kind of apex.

TURBITH, or **TURPETH-ROOT**, in the materia medica, the cortical part of the root of an indian convolvulus, brought to us in oblong pieces, of a brown or ash-colour on the outside, and whitish within; the best is ponderous, not wrinkled, easy to break, and discovering a large quantity of resinous matter to the eye: its taste is at first sweetish; when chewed for a little time, it becomes acid, pungent, and nauseous. This root is a cathartic, not of the safest, or most certain kind; the resinous matter in which its virtues resides, appears to be very unequally distributed, insomuch that some pieces, taken from a scruple to a dram, purge violently; whilst others, in larger doses, have scarce any effect at all. An extract made from the root, is more uniform in strength, though not superior, or equal, to purgatives more common in the shops.

Turbith pays a duty on each pound imported of $11\frac{62\frac{1}{2}}{100}$ d. and draws back, for each pound exported, $10\frac{2}{100}$ d.

TURBITH-MINERAL, a name given by chemists, to a yellow precipitate of mercury, prepared after the following manner. Upon purified quicksilver, contained in a glass vessel, pour double its weight of the strong spirit or oil of vitriol. Heat the liquor by degrees, so as at length to make it boil, till a white mass remains, which is to be thoroughly dried, with a strong fire. This mass, on the effusion of warm water, grows yellowish, and falls into powder; which is to be carefully ground with the water in a glass mortar; then suffer it to settle, pour off the water, and wash the powder in several parcels of fresh water, until it is sufficiently dulcified.

This preparation is a strong emetic, and operates the most powerfully of all the mercurials that can be safely given internally. Its action, however, is not confined to the primæ viæ; it will sometimes excite a pyalism, if a purgative is not soon taken after it. It is used chiefly in violent gonorrhæas, and other venereal cases, where there is a great flux of humours to the parts; the dose is from two grains, to six or eight, though there are some constitutions, which have been used to mercurials, that bear well even the dose of a scruple. This medicine has also of late been recommended,

as the most effectual preservative against the hydrophobia. See HYDROPHOBIA. The washings of turbit mineral are by some externally applied for the itch, and other cutaneous foulnesses; but in these cases, though it often does service, the patient must not be too free with it.

TURBO, in natural history, a genus of univalve shells, with a long, wide, and depressed mouth, in some species approaching to a round shape, and in some having teeth, in others not. They all grow narrow toward the base, and are auriculated, and terminate in a very long and sharp point.

Of this genus, there are a great many elegant species; as the slender turbo, with ventricose spires, and a small round mouth, about five or six inches long. (see plate CCLXXXIX. fig. 3. n^o 1.) The rough screw-shell is represented, (*ibid.* n^o 2.) besides which, there are numerous other species, as the caterpillar-shell, telescope-shell, &c. all distinguished by their different spires, and the form of their mouths.

TURBOT, or **TURBUT**, in ichthyology, the english name of a species of pleuronectes, with the eyes on the right side, and the body smooth. See the article PLEURONECTES.

It grows to a considerable size, and is one of the most esteemed fish at table.

TURCICA TERRA, **TURKY-EARTH**, in the materia medica, a very fine bole or medicinal earth, dug in great plenty in the neighbourhood of Adrianople, and used by the Turks as a sudorific and astringent; and famous among them in pestilential diseases. It is sometimes brought over to us also made up into flatish, orbicular masses of two or three drams weight, and sealed with some turkish characters. This earth is of a somewhat lax and friable texture, yet considerably heavy, of a greyish, red colour, but always redder on the surface than within; extremely soft, and naturally of a smooth surface; it melts freely in the mouth, with a considerably strong, astringent taste. See the article BOLES.

TURCOISE, or **TURQUOISE**, *turquesia*, in natural history, an ore of copper, erroneously ranked among gems. See the article COPPER.

There are, indeed, two kinds of turcois; the one a true and genuine ore of copper; the other the bones of animals tinged to a beautiful blue colour, by

having been buried in places where copper-ore has been near them.

That kind which we usually distinguish by the name of the turquoise of the old rock, and which Pliny and the antients called callais, is a true and genuine copper-ore, and is of exactly that kind in regard to this metal, that the hæmatites is to iron; it is found in the perpendicular fissures of the strata of stone, which contain copper adhering to their sides in form of a crust, and rising into botryoid efflorescences, which sometimes stand single, and are in bigness from the size of a pea to that of a walnut; but sometimes happening to be placed close to one another, they join and form flat crusts or masses, extending, in the manner of crusts of the hæmatites, to three, four, or more inches in breadth; in these the prominent part of every tubercle appearing on the surface, the whole seems a conjunction of semi-circular bodies of a fine blue colour joined by an intermediate substance of the same nature.

This kind of the turquoise is of a very close texture and glossy surface, but very soft, and, when broken, shews the same crustated and striated texture with the hæmatites; only that the striæ are usually finer, and the plates better joined. It ferments with aqua fortis, and may be in great part dissolved by it; and on calcining, it loses all its colour, and becomes of a dirty white. This is produced in Persia, and some other parts of the east. The Germans also have a botryoid copper-ore, in some of their mines; but it is green and much softer than the true turquoise of this kind, though this has been often produced among us also under the name of that gem.

The other turquoise is nothing more than the teeth or bones of animals, which have lain in the way of effluvia, in which copper has been contained, and by this means have acquired veins and streaks of a deep blue, which, on the whole being slightly calcined, diffuse themselves through all the substance, and give it the fine pale blue we so much admire in this gem. If the fire that diffuses this colour be a little too strong, it sends it wholly off, and leaves in place of the turquoise only a white bone. The turquoises of this last kind are common in France; there are mines of them there, and the people who work them are perfectly acquainted

quainted with the method of diffusing the colour through them. These are what are now usually worn, and, when fine, are called, by many of our jewellers, *turquoises* of the old rock, as well as the other. The virtues attributed to this gem are very great, but all we know of it at present is, that, like the other bodies that contain copper, it is a violent emetic, and not fit to be received into practice.

TURCOMANIA, a province of asiatic Turkey, bounded by Persia on the east, and answers to the antient Armenia; its capital is Erzerum. See **ERZERUM**.

TURDUS, in ornithology, a genus of birds, of the order of the *passeres*, the beak of which is of a conic form, and straight, only somewhat bent on the upper part, and has no membrane at the base: the tongue is lacerated and emarginated.

Under this genus are comprehended the black bird, thrush, red-wing, &c. See the article **BLACK-BIRD**, &c.

TURDUS, in ichthyology, the name by which authors call the green labrus, with a blue line on each side; a very beautiful fish, from eight to fourteen inches in length, and considerably thick in proportion. See the article **LABRUS**.

TURENNE, a town of Guienne, in France: east long. $1^{\circ} 20'$, and north lat. $45^{\circ} 7'$.

TURF, a blackish sulphureous earth, used in several parts of the kingdom as fuel. See **FUEL** and **TUREARY**.

TURGESCENT, or **TURGESCENTY**, among physicians, denotes a swelling, or growing bloated.

TURIN, the capital of Piedmont, in Italy, and of the king of Sardinia's dominions, is situated at the confluence of the rivers Po and Doria, 100 miles south west of Milan: east long. $7^{\circ} 16'$, and north lat. $44^{\circ} 50'$.

TURIONES, among herbalists, denotes the first young tender shoots, which plants annually put forth.

TURKEY, *meleagris*, in ornithology, a genus of birds, the anterior part of the head of which is covered with a fleshy pendulous substance, the sides of the head also, and the throat, are covered with a papillose fleshy matter, and there is a longitudinal fleshy crest, of a reddish, bluish, or purplish colour, and a soft substance. This is a large, but unweildy bird; the head is strangely covered and ornamented with a pendulous, soft, fleshy, substance, as already observed; the eyes

are small, but bright and piercing, the wings are moderately long, though not at all formed for supporting so large a bulk in long flights, they have each twenty-eight long feathers; the tail is long and large, the legs moderately long and very robust.

There is but one known species of this genus.

TURKEY, a very extensive empire, comprehending some of the richest countries in Europe, Asia, and Africa.

Turkey in Europe, comprehends Romania, Bulgaria, Servia, Bosnia, Ragusa, Wallachia, Moldavia, Bessarabia, Budziac, Crim, and Little Tartary, with Albania, Epirus, Macedonia, Thessaly, and all the antient Greece, with its numerous islands. See **ROMANIA**, &c.

Turkey in Asia, comprehends Natolia, Diarbeck, Syria, Turcomania, and part of Georgia and Arabia. See the article **NATOLIA**, &c.

And Turkey in Africa, comprehends the fruitful and extensive country of Egypt. See the article **EGYPT**.

TURKEY-EARTH. See **TURCICA TERRA**.

TURMERIC, in the materia medica, the root of a plant, called by botanists *curcuma*. See the article **CURCUMA**.

It is a small root, of an oblong figure, usually met with in pieces from half an inch to an inch or two in length, and at the utmost surface the thickness of a man's little finger; its surface is uneven, and rises into knobs in many places, and the longer pieces are seldom very straight; it is very heavy and hard to break; it is not easily cut through with a knife, but, when cut, leaves a glossy surface. Its colour externally, is a pale whitish grey, with some faint tinge of yellowness, and when broken, is of a fine yellow within; this colour is bright and pale, and without admixture, when the root is fresh; but in keeping it by degrees becomes reddish; and at length is much like saffron in the cake. Thrown into water, it speedily gives it a fine yellow tinge, and, chewed in the mouth, it gives the spittle the same colour. It is easily powdered in the mortar, and, according to its different age, makes a yellow, an orange colour, or a reddish powder. It has a kind of aromatic smell, with something of the odour of ginger in it. The taste is acrid and disagreeable, and has a considerable bitterness.

It is brought from the East-Indies, where they use it in sauces and foods. As a medi-

medicine, it is esteemed aperient and emmenagogue, and of singular efficacy in the jaundice.

But besides these uses, the glovers use it for dyeing their leather, and the turners to give an agreeable yellow to several of their works made in the whiter woods.

TURN, in law, a court held twice a year, viz. within a month after Easter and Michaelmas, respectively, by the sheriff of every county.

By magna charta, sheriffs were restrained from holding pleas of the crown; but they are still judges of record, and may take indictments and presentments, and inquire of all treasons and felonies by the common law, as well as the lowest offences against the king; common nuisances, annoyances, purprestures, &c. Also of persons selling corrupt victuals, breaking the assize of ale and beer, or keeping false weights, &c. disturbers of the peace and barretors, &c. and may amerce for offences, &c.

TURNADO, or **TORNADO**, a wind which on some coasts blows all night from the shore.

TURNAMENT, or **TOURNAMENT**, a martial sport, or exercise, which the antient cavaliers used to perform to shew their bravery and address.

TURNER, *rapa*, in botany, a species of Brassica. See the article **BRASSICA**.

TURNERA, in botany, a genus of the pentandria-trigynia class of plants, the flower of which consists of five petals obversely cordated, and sharp-pointed; the fruit is an oval, unilocular capsule, containing a great many oblong and obtuse seeds.

TURNHOUT, a town of Brabant, twenty-four miles north-east of Antwerp.

TURNING, a branch of sculpture, being the art of fashioning hard bodies, as brass, ivory, wood, &c. into a round or oval form, in a lathe.

Turning is performed by putting the substance to be turned upon two points as an axis, and moving it round on that axis; while an edge-tool, set steady to the outside of the substance in a circumvolution thereof, cuts off all the parts which lie farther off the axis, and makes the outside of that substance concentric to the axis. See the article **LATHE**.

The invention of turning seems to have been very antient. Some, indeed, to do honour to the age, will have it brought to perfection by the moderns; but, if

what Pliny and some other antient authors relate, be true, that the antients turned those precious vases enriched with figures and ornaments in relievo, which we still see in the cabinets of the curious, it must be owned that all that has been added in these ages, makes but a poor amends for what we lost of the manner of turning of the antients.

TURNING-EVIL, in cattle, a disease that causes them frequently to turn round in the same place. It is also called the *sturdy*. The common remedy, recommended by Mr. Markham, is to throw the beast down, and bind him; then to open his skull, and take out a little bladder, filled with water and blood, which usually lies near the membrace of the brain, and then gradually heal the wound.

TURNPIKE, a gate set up a-crois a road, watched by an officer for the purpose, in order to stop travellers, waggons, coaches, &c. to take toll of them towards repairing or keeping the roads in repair.

Justices of the peace, and other commissioners, are authorized to appoint surveyors of the roads, and collectors of toll, which is usually 1 s. or 6 d. for a coach or waggon, and 1 d. for a horse, &c. In case any persons shall drive horses or other cattle through grounds adjoining to the highways, thereby to avoid the toll, they are liable to forfeit 10 s. Likewise if any one assaults a collector of the tolls, or by force passes through a turnpike-gate without paying, he forfeits 5 l. leviable by justices of peace; and maliciously pulling down a turnpike is deemed felony, &c. It is also enacted; that 20 s. shall be paid for every hundred that a carriage with its loading weighs above 6000 pound weight, and that engines may be set up at turnpikes for weighing such carriages.

TURNPIKE, is also used in the military art. for a beam struck full of spikes, to be placed in a gap, a breach, or at the entrance of a camp, to keep off an enemy. See the article *CHEVAUX de frise*.

TURNSOLE, or **TORNSOLE**, in botany, the english name for the croton of Linnaeus, and the heliotropium-tricoccum of other authors. See **CROTON**.

TURPENTINE, a transparent sort of resin, flowing either naturally or by incision from several unctuous and resinous trees, as the terebinthus, larch, pine, fir, &c. We distinguish several kinds of turpentine; as that of Chio, that of Venice,

that of Bourdeaux, that of Cyprus, Strasburg, &c.

The turpentine of Chio or Scio, which is the only genuine kind, and that which gives the denomination to all the rest, is a whitish resin, bordering a little on green, very clear, and a little odoriferous; drawn by incision from a tree called terebinthus, very common in that island, as also in Cyprus, and some parts of France and Spain.

The resin must be chosen of a solid consistence almost without either taste or smell, and not at all tenacious, which distinguishes it from the false turpentine of Venice, commonly substituted for it, which has a brisker smell, a bitter taste, and sticks much to the finger. This turpentine of Chio is indisputably the best, but its scarcity occasions it to be little in use. The turpentine of Venice is falsely so called; for, though there was a turpentine antiently brought from Venice, yet, that now so called comes from Dauphine. It is liquid, of the consistence of a thick syrup, and whitish; and flows either spontaneously or by incision, from the larch or larch-tree chiefly in the wood de Pilatze.

That flowing naturally, called by the peasants *bijon*, is a kind of balsam, not inferior in virtue to that of Peru, for which it is frequently substituted. That drawn by incision, after the tree has ceased to yield spontaneously, is of considerable use in several arts, and it is even of this that varnish is chiefly made. It must be chosen white and transparent, and care be taken that it be not counterfeited with oil of turpentine. The turpentine of Bourdeaux is white, and as thick as honey. It does not ooze from the tree in the manner it is sent to us, but is properly a composition wherein among other ingredients is a white hard sort of resin called *galipot*. See *PITCH*. The turpentine of Strasburg, the produce of the *abies* or silver fir, is that most commonly used among us, and is preferred by our people to that of Venice, which is distinguished from it by its green hue, fragrant smell, and citron-flavour.

The uses of turpentine in medicine are innumerable. It is a great vulnerary, and very detergent, and as such is prescribed in abscesses, ulcerations, &c. It promotes expectoration, and as such is prescribed in diseases of the lungs and breast; but it is most famous for clear-

ing the urinary passages, and as such prescribed in obstructions of the reins, in gonorrhœas, &c.

Oil of TURPENTINE. There are two kinds of oil drawn from turpentine, by distillation; the first white, the second red, both esteemed as balsams proper for the cure of wounds, chilblains, &c. But they are so little used among us, that it is not easy to procure either of them.

What is commonly sold under the name of oil of turpentine, or ethereal oil, is only a distillation of the resinous juice of the tree, fresh as it is gathered. It is used with success in the cure of green wounds, as also by the painters, farriers, &c. To be good, it must be clear and pellucid as water, of a strong penetrating smell, and very inflammable.

TURPENTINE-TREE, *terebintbus*, in botany, a species of *pistacia*. See the article *PISTACIA*.

TURQUOISE, or *TURCOISE*. See the article *TURCOISE*.

TURRITIS, *TOWER-MUSTARD*, in botany, a genus of the *tetradynamia-filicosa* class of plants, with a tetrapetalous cruciform flower: its fruit is an extremely long pod, containing numerous seeds.

TURSIS, a town of the kingdom of Naples, in Italy, situated ten miles north-west of the gulph of Taranto: east long. 17° 6', north lat. 40° 15'.

TURUNDA, in medicine and surgery, denotes a tent, pellet, or pencil; or a piece of lint thrust into a wound, ulcer, &c. See the article *TENT*.

TURTLE, in ichthyology, a name given to some species of the *testudo*, as the hawk's bill turtle is the *testudo* with acuminate unguis, four on the hinder as well as the fore feet; the green turtle, or the *testudo*, with two unguis on the fore feet, and one on the hinder; and the long headed turtle, or the great oval headed *testudo*. See the article *TESTUDO*.

TURTLE DOVE, is a species of the *columba* kept tame. See *COLUMBA*.

TUSCAN ORDER, in architecture, the first, simplest, and most massive of the five orders. See pl. CCLXXXVIII. fig. 1. The tuscan is called the rustic order by Vitruvius, and M. de Cambray agrees with him, who in his parallel, says, it never ought to be used but in country-houses and palaces. M. Le Clerc adds, that in the manner Vitruvius, Palladio, and some others, have ordered it, it does not deserve to be used at all. But in Vignola's manner of composition, he al-

lows

Fig. 1. The TUSCAN Order.

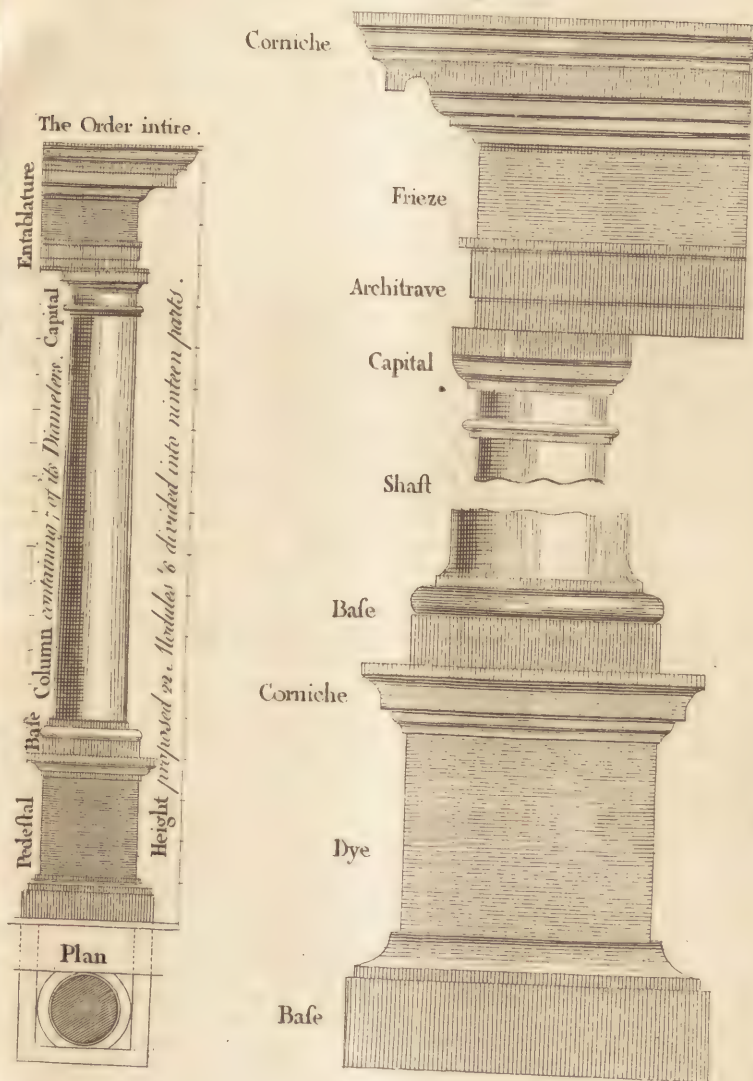


Fig. 2. TRESSURE



Fig. 3. VAIR.



Fig. 4. VAIRY CUPPY.



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C. A. 7

flows it a beauty, even in its simplicity, and such as makes it proper, not only for private houses, but even for public buildings, as in the piazzas of squares and markets, in the magazines and granaries of cities, and even in the offices and lower apartments of palaces.

The tuscan has its character and proportions as well as the other orders; but we have no antient monuments to give us any regular tuscan pillar for a standard. M. Perrault observes, that the characters of the tuscan are nearly the same with those of the doric, and adds, that the tuscan is in effect no more than the doric made somewhat stronger, by shortening the shaft of the column; and simpler, by the small number, and largeness of the mouldings. See DORIC.

Vitruvius makes the whole height of the order fourteen modules, in which he is followed by Vignola, M. Le Clerc, &c. Serlio makes it but twelve. Palladio gives us but one Tuscan profile much the same as that of Vitruvius, and another too rich, on which side Scamozzi is likewise too faulty. Hence it is, that that of Vignola, who has made the order very regular, is most followed by the modern architects.

Of all the orders, the tuscan is the most easily executed, as having neither triglyphs nor dentils, nor modillions, to cramp its intercolumns. On this account, the columns of this order may be ranged in any of the five manners of Vitruvius, viz. the pycnostyle, systyle, eustyle, diastyle, and aræostyle. See the articles PYCNOSTYLE, SYSTYLE, &c.

TUSCAN order by proportions of equal parts.

The height of the pedestal, being two diameters, is divided into 4, giving 1 to the base, whose plinth is $\frac{2}{3}$ thereof, the other part is divided into three, giving one to the fillet, and two to the hollow. The breadth of the die or naked is one diameter, and $\frac{1}{3}$, and the projection of the base is equal to its height, the fillet hath three-fourths thereof. The height of the cornice is half the base, being $\frac{1}{2}$ of the whole height, and is divided into 8, giving 2 to the hollow, 1 to the fillet, and 5 to the band; the projection is equal to the base, and the fillet hath three of these parts. Base of the column: the height is one half a diameter, and is divided into six parts, giving three to the plinth, 2 and $\frac{1}{2}$ to the torus, and $\frac{1}{2}$ a part to the fillet; the whole projection is $\frac{1}{2}$ of its height. The hollow, or cinclure, is one

fourth of a circle, in all the orders, and belongs to the shaft of the column.

The diminishing of this column is $\frac{1}{4}$ of the diameter, and is divided into 9, giving 2 $\frac{1}{2}$ to the frieze of the capital, $\frac{1}{2}$ a part to the fillet, 3 to the ovolo, and 3 to the abacus. The whole projection is $\frac{1}{2}$ of the diameter, being perpendicular to the body of the column below, and the fillet projects equal to its height. The collerino, or necking of all the orders in general, is one of those nine parts in the capital, and the fillet half a part, the projection is 1 and $\frac{1}{4}$ of these parts, and the fillet equal to its height. The height of the entablature being one diameter and $\frac{1}{2}$, is divided into 6, giving 2 to the architrave, 1 $\frac{1}{2}$ to the frieze, and 2 $\frac{1}{2}$ to the cornice.

For the members of the architrave, divide the height into seven parts, giving 2 $\frac{1}{2}$ to the first face, 3 $\frac{1}{2}$ to the second, and 1 to the band at top. The projection is equal to the band, and the second face a third thereof. The first face of all the architraves is perpendicular to the naked of the column at the top. For the cornice, divide the height into 9, giving 1 $\frac{1}{2}$ to the hollow, $\frac{1}{2}$ to the fillet, 1 $\frac{1}{2}$ to the ovolo, 2 to the corona, $\frac{1}{2}$ a part to the fillet, 2 to the scima recta, and 1 to the fillet. For the projections, the hollow hath 2 of these parts, the ovolo 3 $\frac{1}{2}$, the corona 6, the fillet 6 $\frac{1}{2}$, and the whole 9 being equal to the height. See the figure.

TUSCAN EARTH, in the materia medica, a yellowish, white, pure bole, considerably heavy, of a very smooth surface, not easily breaking between the fingers, but adhering slightly to the tongue, and melting very readily in the mouth. It is dug in many parts of Italy, particularly about Florence, where there is a stratum of it eight or ten feet thick, at the depth of five or six from the surface. It is given as a sudorific, and esteemed a great medicine in fevers, attended with diarrhoeas. See the article BOLES.

TUSCANY, a dutchy of Italy, encompassed by the pope's territories on the north-east and south, and bounded by the Tuscan Sea on the south-west, and by the territories of Lucca and Modena on the north-west, being 100 miles long, and almost as many broad.

TUSCULAN, in matters of literature, a term which frequently occurs in the phrase *tusculan questions*. Cicero's tusculan questions are disputations on several topics in moral philosophy; which that great

great author took occasion to denominate from Tusculanum, the name of a country-seat or villa, where they were composed, and where he lays the scene of the dispute. They are comprised in five books, the first on the contempt of death; the second of enduring pain; the third on asswaging grief; the fourth on the other perturbations of the mind; and the last, to shew that virtue is sufficient to a happy life.

TUSSILAGO, in botany, a genus of the syngenesia-polygamia superflua class of plants, the compound flower of which is various. In some there are only tubulose hermaphrodite corollulæ: there are no female ones. In others, there are tubulose hermaphrodite ones on the disk; the female ones are ligulated on the verge. In others, there are tubulose hermaphrodite flowers on the disk; the female ones being naked, and mixed with the petal, which is infundibuliform; the limb is quinquefid or quadrid, acute, bent backwards, and longer than the cup. There is no pericarpium except the cup: the seed following the hermaphrodite flower is single, oblong, compressed, and by a small thread sustains a hairy pap. If there are any seeds following the female flower, they are like the hermaphrodite ones.

This genus comprehends the tussilago, or common colt's-foot, the cacalia, and the petasites, or butter-bur.

The common tussilago, or colt's-foot, stands recommended in coughs, and other disorders of the breast and lungs; practice, however, seems to have almost rejected it. The petasites, or butter-bur, has been given in the dose of a dram, or more, as an aromatic, and likewise as an aperient and deobstruent; these virtues, however, it possesses in so small a degree, as to have lost its reputation in the shops.

TUSSIS, the cough. See **COUGH**.

TUT, in armory, &c. an imperial ensign of a golden globe, with a cross on it.

TUTBURY, a market-town of Staffordshire, situated eighteen miles east of Stafford.

TUTELARY, *tutelaris*, one who has taken something into his patronage and protection.

TUTOR, in the civil law, is one chosen to look to the person and estate of children left by their fathers and mothers in their minority. A person nominated tutor either by testament, or by the relations of the minor, is to decline that office if he have five children alive, if he have any

other considerable tutorage, if he be under twenty-five years of age, if he be a priest, or a regent in an university, or if he have any law suit with the minors, &c. The marriage of a pupil, without the consent of his tutor, is invalid. Tutors may do any thing for their pupils, but nothing against them, and the same laws which put them under a necessity of preserving the interest of the minors, put them under an incapacity of hurting them. See the article **TUTORAGE**.

TUTOR, is also used in our universities for a member of some college or hall, who takes on him the instruction of some young students in the arts or faculties.

TUTORAGE, *tutela*, in the civil law, a term equivalent to guardianship in the common law, signifying an office imposed on any one to take care of the effects of one or more minors. See **GUARDIANSHIP** and **TUTOR**.

By the roman law, there are three kinds of tutorage; testamentary, which is appointed by the father's testament; legal, which is given by the law to the nearest relation; and dative, which is appointed by the magistrate. But in all customary provinces, as France, &c. all tutorages are dative and elective, and though the father have by testament nominated the next relation to his pupil, yet is not that nomination of any force, unless the choice be confirmed by that of the magistrate, &c. By the roman law, tutorage expires at fourteen years of age. See the article **CURATOR**.

TUTTY, *tutia*, a crement of mixed metals, in which lapis calaminaris, or zink in its metallic form, is an ingredient, collected in the furnaces where brass is made from copper and calamine, and where the mixed metals are run. In these furnaces they place, under the roof and about the upper parts of the sides, rods of iron, and sometimes rolls of dry earth, about which the tutty is afterwards found. Therefore the tutty which we use in the shops at this time, owes its origin truly and properly to zink, which sublimes with a very small fire into a kind of flowers, and when fused with any other metal, flies from it in abundance under this form, and also frequently takes some part of that metal, more or less, up with it. Hence it is evident, that the tutty or cadmia of the ancients, must have been wholly different from ours, as they used no zink nor any of its ores in the furnace where they collected



lected it. See ZINK and CADMIA.

Our tutty then is a hard and heavy semi-metallic recement, sometimes met with in the shops in thin flat pieces or flakes, but most abundantly in tubular cylindric pieces, resembling segments of the barks of trees pushed off from the branches without breaking; these are of different lengths and diameters. The finest tutty is that of a fine deep brown on the outside, and of a yellowish tinge within; the thickest, brightest, and most granulated; the hardest to break, and that which has least foulness among it.

Tutty is celebrated as an ophthalmic, and frequently employed as such in ungents and collyria. See COLLYRIA.

It is to be prepared for use by heating it several times red hot, and quenching it suddenly in rose or common water; then powdering it in a mortar, and finally levigating it with a little water upon a smooth hard marble, till there does not remain the least gritty particle among it. It is then to be dropped upon a chalk-stone, and left to dry.

TUXFORD, a market-town of Nottinghamshire, twenty miles north-east of Nottingham.

TUY, a town of Spain, in the province of Galicia, situated on the river Minho, on the confines of Portugal, twelve miles east of Vigo.

TWA-NIGHTS GESTE, among our ancestors, was a guest that stayed at an inn a second night, for whom the host was not answerable for any injury done by him, as he was in case of a third night-awn hynde.

TWEED, a river of Scotland, which rises on the confines of the shire of Clydesdale, and running eastward through Tweedale, and dividing the shire of Mers from Tiviotdale and Northumberland, falls into the German sea at Berwick.

TWEEDALE, a county of Scotland, bounded by Lothian on the north, by Mers and Tiviotdale on the east, by Annandale on the south, and Clydesdale on the west.

TWEER, a city of Russia, capital of the province of Tweer, situated on the river Wolga, ninety miles north of Moscow, in east long. $30^{\circ} 37'$, north lat. $57^{\circ} 25'$.

TWELF-HINDI, among the English Saxons, was where every person was valued at a certain price; and if any injury was done either to a person or his goods, a pecuniary mulct was imposed, and paid in satisfaction of that injury, according

to the worth and quality of that person to whom it was done, in which case such as were worth 1200 shillings, were called twelf-hindi; and if an injury was done to such persons, satisfaction was to be made accordingly.

TWELFTH-DAY, or TWELFTH-TIDE, the festival of the epiphany, or the manifestation of Christ to the Gentiles; so called, as being the twelfth day, exclusive, from the nativity or Christmas-day.

TWELVE MEN, otherwise called jury or inquest, is a number of twelve persons, or upwards, as far as twenty-four, by whose oath, as to matters of fact, all trials pass, both in civil and criminal cases, through all courts of the common law in this realm. See JURY and TRIAL.

TWI-HINDI, among our Saxon Ancestors, were persons valued at 200s. these men were of the lowest degree, and if such were killed, the mulct was 30s. See the article TWELFTH-HINDI.

TWILIGHT, *crepusculum*, that light, whether in the morning before sun-rise, or in the evening after sun-set, supposed to begin and end when the least stars that can be seen by the naked eye cease, or begin, to appear, represented in plate CCLXXXIX. fig. 1. by that obscure part comprehended between HOAB, which is neither dark nor light. This is the twilight, the line AB being 18° below the horizon HO; and during the time the sun passeth from HO to AB, in the parallel of any day, his rays are partly reflected by the atmosphere, and so we have some faint light till he gets below the limit AB, when we are left in total darkness. Or it is twilight, while the sun is passing from X to R, from Y to S, and from Z to M, on the days the sun describes the parallels TR, $\mathcal{A}EQ$ and VW. By means of the atmosphere it happens, that though none of the sun's direct rays can come to us after it is set, yet we still enjoy its reflected light for some time, and night approaches by degrees. For after the sun is hid from our eyes, the upper part of our atmosphere remains for some time exposed to its rays, and from thence the whole is illuminated by reflection. But as the sun grows lower and lower, that portion of the atmosphere which is above our horizon, becomes enlightened till the sun has got eighteen degrees below it; after which it ceases to be illuminated thereby, till it has got within as many degrees of the eastern side of the horizon; at which time

time it begins to illuminate the atmosphere again, and in appearance to diffuse its light throughout the heavens, which continues to increase till the sun be up. See AIR, ATMOSPHERE, REFLECTION, and REFRACTION.

Hence it is, that during that part of the year in which the sun is never eighteen degrees below our horizon, there is a continued twilight from sun-setting to sun-rising. Now that part of the year in the latitude of London, is while the sun is passing from about the fifth degree of gemini to the twelfth of cancer; that is, from about the 26th of May to the 18th of July: for when the sun describes the parallel TR, that is, the tropic of cancer, there is no dark night at all; for the parallel of that day, TR, doth not touch AB, nor will it for about a month before and after. On the other hand, the shortest twilight in the year happens about the 14th of October and 4th of March, for then the sun describes the parallel whose distance eo is the least between HO and AB of any other whatsoever.

As the twilight depends on the quantity of matter in the atmosphere fit to reflect the sun's rays, and also on the height of it (for the higher the atmosphere is, the longer will it be, before the upper parts of it will cease to be illuminated) the duration of it will be various. For instance, in winter, when the air is condensed with cold, and the atmosphere upon that account lower, the twilight will be shorter; and in summer, when the limits of the atmosphere are extended by the rarefaction and dilatation of the air, of which it consists, the duration of the twilight will be greater. And for the like reason, the morning twilight, the air being at that time condensed and contracted by the cold of the preceding night, will be shorter than the evening one, when the air is more dilated and expanded.

TWINS, two young ones delivered at a birth, by an animal which ordinarily brings forth but one.

TWINS, in astronomy, the same with gemini. See the article GEMINI.

TWIST of a rope, cord, &c. See the article ROPE, &c.

TWIST is also used for the inside or flat part of a man's thigh, upon which a true horseman rests when on horseback.

To **TWIST** an horse, is violently to wring or twist his testicles twice about, which causes them to dry up, and deprives them

of nourishment, and reduces the horse to the same state of impotency with a gelding.

TWISTED COLUMN. See COLUMN.
TYCHONIC SYSTEM, or **HYPOTHESIS**, an order or arrangement of the heavenly bodies, of an intermediate nature between the copernican and ptolemaic, or participating alike of them both. See the articles COPERNICAN and PTOLEMAIC. This system had its name and original from Tycho Brahe, a nobleman of Denmark, who lived in the latter part of the last century. This philosopher, though he approved of the copernican system, yet could not reconcile himself to the motion of the earth; and being on the other hand convinced the ptolemaic scheme could not be true, he contrived one different from either, as represented plate CCLXXXIX, fig. 2. In this the earth has no motion allowed it, but the annual and diurnal phenomena are solved by the motion of the sun about the earth, as in the ptolemaic scheme; and those of mercury and venus are solved by this contrivance, though not in the same manner, nor so simply and naturally as in the copernican system. The tychonic system then supposed the earth in the center of the world, that is, of the firmament of stars, and also of the orbits of the sun and moon; but at the same time it made the sun the center of the planetary motions, viz. of the orbits of mercury, venus, mars, jupiter and saturn. Thus the sun, with all its planets, was made to revolve about the earth once a year, to solve the phenomena arising from the annual motion, and every twenty-four hours, to account for those of the diurnal motion. But this hypothesis is so monstrously absurd, and contrary to the great simplicity of nature, and, in some respects, even contradictory to appearances, that it obtained but little credit, and soon gave way to the copernican system.

After this scheme had been proposed for some time, it received a correction by allowing the earth a motion about its axis to account for the diurnal phenomena of the heavens; and so this came to be called the semi-tychonic system. But this was still void of the truth, and encumbered with such hypothesis, as the true mathematician and the genuine philosopher could never relish.

TYGER, or **TIGER**, in zoology. See the article TIGER.

TYLE, or **TILE**, in building, a sort of thin

thin, fistitious, laminated brick, used on the roofs of houses; or more properly a kind of fat clayey earth, kneaded and moulded, of a just thickness, dried and burnt in a kiln like a brick, and used in the covering and paving of houses. See the article BRICK.

Tyles are made, says Mr. Leybourn, of better earth than brick-earth, and something nearer akin to the potter's earth. According to 17 Edward IV. the earth for tyles should be cast up before the first of November, stirred and turned before the first of February, and not made into tyles before the first of March; and should likewise be tried and severed from stones, marle, and chalk. For the method of burning them, see the article BRICK.

As to the method of applying tyles, some lay them dry as they come from the kiln, without mortar or any thing else; others lay them in a kind of mortar made of loam and horse dung. In some parts, as in Kent, they lay them in moss. See the article MORTAR, &c.

There are various kinds of tyles, for the various occasions of building; as plain, thack, ridge, roof, crease, gutter, pan, crooked, flesish, corner, hip, dormar, scallop, astragal, traverse, paving, and dutch tyles.

Plain or thack tyles, are those in ordinary use for covering of houses. They are squeezed flat, while yet soft, in a mould. They are of an oblong figure, and by 17 Ed. IV. c. 4. are to be $10\frac{1}{2}$ inches long, and $6\frac{1}{4}$ broad, and half an inch and half a quarter thick. But these dimensions are not over strictly kept to. Ridge, roof or crease tyles, are those used to cover the ridges of houses, being made circular breadth-wise, like an half cylinder; they are, by the aforesaid statute, to be 13 inches long, and of the same thickness with the plain tyles. Hip or corner tyles, are those which lie on the hips or corners of roofs. As to form, they are first made flat like plain tyles, but of a quadrangular figure, whose two sides are right lines and two end arches of circles, one end being a little concave and the other convex. The convex end is to be about seven times as broad as the concave end, so that they would be triangular but that one corner is taken off; then, before they are burnt, they are bent on a mould breadth-wise, like ridge tyles. They have an hole at their narrow end to nail them on by, and are laid with their narrow end upwards; by sta-

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tute they are to be $10\frac{1}{2}$ inches long, and of a convenient breadth and thickness. Gutter-tyles, are those which lie in gutters or valleys in cross buildings. They are made like corner tyles, only the corners of the broad end are turned back again with two wings. They have no holes in them, but are laid with the broad end upwards, without any nailing. They are made in the same mould as the corner tyles, and have the same dimensions on the convex side. Their wings are each four inches broad, and eight long. Pan, crooked, or flesish tyles, are used in covering of sheds, lean to's, and all kinds of flat roof buildings. They are in form of an oblong parallelogram, as plain tyles, but are bent breadth-wise forwards and backwards in form of an S, only one of the arches is at least three times as big as the other; which biggest arch is always laid uppermost, and the less arch of another tyle lies over the edge of the great arch of the former. They have no holes for pins, but hang on the laths by a knot of their own earth. They are usually $14\frac{1}{2}$ inches long, and $10\frac{1}{2}$ broad. By 12 Geo. I. c. 25. they are to be, when burnt, not less than $13\frac{1}{2}$ inches long, and $9\frac{1}{2}$ inches wide, and half an inch thick. Dormar or dorman tyles consist of a plain tyle and a triangular piece of a plain one standing up at right angles to one side of the plain tyle, and swept with an arch of a circle from the other end, which end terminates in a point. Of these tyles there are two kinds, the triangular piece in some standing on the right, in others on the left side of the plain tyle. And of these again there are two kinds, some having a plain whole tyle, others but half a plain tyle. But in them all the plain tyle has two holes for the pins at that end where the broad end of the triangular piece stands. Their use is to be laid in the gutters betwixt the roof and the cheeks or sides of the dormars, the plain part lying on the roof, and the triangular part standing perpendicularly by the cheek of the dormar; they are excellent to keep out the wet in those places, and yet they are hardly known any where but in Suffex. The dimensions of the plain tyle part, are the same as those of a plain tyle, and the triangular part is of the same length, and its breadth at one end seven inches, and at the other nothing. Scallop or astragal tyles are in all respects like plain tyles, only their lower ends are in form of an astragal, viz. a

semi-circle with a square on each side. They are used in some places for weather tyling. Transverse tyles, are a kind of irregular plain tyles, having the pin-holes broken out, or one of the lower corners broken off. These are laid with the broken end upwards, upon rafters where pinned tyles cannot hang.

Flemish or dutch tyles are of two kinds, antient and modern; the antient were used for chimney foot-paces; they were painted with antique figures, and frequently with postures of soldiers, some with compartments, and sometimes with moresque devices; but they come much short of the design and colours of the modern ones. The modern flemish tyles are commonly used plastered up in the jaumbs of chimneys instead of chimney-corner stones. These are better glazed, and such as are painted (for some are only white) are done with more curious figures and more lively colours than the antient ones. But both kinds seem to be made of the same whitish clay as our white glazed earthen ware; the modern ones are commonly painted with birds, flowers, &c. The antient ones are only five inches and a quarter square, and about three quarters of an inch thick; the modern ones six inches and a half square, and three quarters of an inch thick.

TYLE, in assaying, a small flat piece of dried earth used to cover the vessels in which metals are in fusion. Cramer directs, that these be made of a mixture of clay and sand, or powder of flints, or broken crucibles, formed into a paste, and spread thin with a rolling-pin on a table, or flat stone. From these cakes or plates, pieces are to be cut with a knife, to the shape and size of the mouths of the vessels to be closed. It is best then to pare away the borders of the under surface of the piece thus cut off, that this surface may immediately touch all the way the edge of the mouth of the vessel, leaving a prominent rim, by which means the tile fits close upon the vessel, and is not so easily displaced by accidents, as a touch of the poker, or of the coals put on to mend the fire, as it otherwise would be. Finally, put on the middle of the outer surface a small bit of the same matter, which serves as a kind of handle, by means of which it may be conveniently managed by the tongs, and easily taken off and put on again at pleasure.

TYLER, one that covers or paves with

tyles. Tylers and bricklayers were incorporated 10 Eliz. under the name of master and wardens of the society of free-men of the mystery and art of tylers and bricklayers.

TYLWITH, in matters of heraldry and descent, is sometimes used for a tribe or family branching out of another, which the modern heralds more usually call the second or third house.

TYMPAN, or **TYMPANUM**, in architecture, the area of a pediment, being that part which is in a level with the naked of the frieze. Or it is the space included between the three corniches of a triangular pediment, or the two corniches of a circular one.

Sometimes the tympan is cut out, and the part filled with an iron lattice to give light, and sometimes it is enriched with sculpture in basso-relievo.

TYMPAN, among joiners, is also applied to the panels of the doors. See **PANEL**.

TYMPAN of an arch, is a triangular space or table in the corners or sides of an arch, usually hollowed, and enriched sometimes with branches of laurel, olive-tree, or oak, or with trophies, &c. Sometimes with flying figures, as fame, &c. or sitting figures, as the cardinal virtues.

TYMPAN, among printers, a double frame belonging to the press, covered with parchment, on which the blank sheets are laid in order to be printed off. See the article **PRINTING-PRESS**.

TYMPANUM, or **TYMPAN**, in mechanics, a kind of wheel placed round an axis or cylindrical beam, on the top of which are two levers or fixed staves, for the more easy turning the axis, in order to raise a weight required. The tympanum is much the same with the peritrochium, but that the cylinder of the axis of the peritrochium is much shorter, and less than the cylinder of the tympanum. See **AXIS** in *peritrochio*.

TYMPANUM of a machine, is also used for an hollow wheel, wherein one or more people, or other animals, walk to turn it; such as that of some cranes, calendars, &c. See the article **CRANE**, &c.

TYMPANUM, in anatomy, the middle part of the ear. See the article **EAR**.

TYMPANUM, a drum. See **DRUM**.

TYMPANY, *tympanites*, in medicine, a flatulent tumour or swelling of the abdomen or belly; very hard, equable and permanent, whereby the skin is stretched so tight, that when struck it gives a sound like that of a drum. Hoffman observes, that

that this disease has been generally accounted, both by the antients and moderns, a species of dropsy, but very improperly; for though it is often productive of, or complicated with an ascites, yet it is in itself a perfectly distinct disease, and accompanied with no extravasation of water in the abdomen; persons who have died of it having been found, on opening the body, with the abdomen as dry as in a state of health; but the stomach has been found, in some, greatly distended with flatulencies, and containing a viscid humour, though in no great quantity. The intestines are also usually found distended, and, as it were, pellucid, and, on being pricked, they collapse, without the appearance of any water. And, in some cases, on opening the abdomen, the whole swelling has subsided, on the exclusion of a gross flatulence which had distended it. The intestines have, in some subjects, been found distended to the bigness of a man's thigh, in some parts, and in others, lower down, so contorted and twisted together, that there could be no passage either for the wind or the excrements. It is not uncommon also, on dissection, to find great numbers of worms, of the common long kind, in the intestines. See the article DROPSY.

A tympany, without a dropsy, is most incident to women after labour, when the lochia have been suppressed by colds or otherwise, or discharged in too small quantities; a bad regimen during the lying in, and the omitting to swathe the belly properly down, has also often a bad effect this way. In cases of this kind, women find soon afterwards the abdomen inflated, with a considerable uneasiness, a difficulty of breathing, costiveness, and an unaccountable anxiety. These are the breeding symptoms of the approaching tympany; and the same often happens after unskilful treatment in abortions, and after the leaving a part of the lochia behind, or the injuring the uterus in delivery. See DELIVERY.

Children are also subject to tympanies, when violently afflicted with worms, and sometimes after the measles and small-pox; and if due care is not taken of these cases, at their beginning, the superior parts soon become extenuated, and the patients die. Extreme voracity of children also, and their eating great quantities of food, at a time when the stomach is weak, sometimes brings on this disorder.

The tympany is justly accounted one of the more dangerous kinds of diseases, since the persons afflicted with it much oftener die than recover. When it is accompanied with a dropsy, it is scarce ever cured; and a simple tympany in women and children, if neglected at first, degenerates into a chronic disorder, and hardly admits of a cure. Some, indeed, have gone so far as to say, they never knew a patient, afflicted with a tympany, recover; but this seems too rash a judgment. That distention of the abdomen, which is properly called a flatulent colic, is by some accounted a species of tympany; but this is not naturally dangerous, and is easily cured, except when it is attended with spasms of the viscera; in which case the medicines given to restore the due tone of the intestines, are by no means proper in regard to the spasms.

In curing flatulences of the stomach and intestines, the physician's principal intention is to promote a discharge of the vapours by the anus, and to attenuate and gently carry off, by stool, the rough and viscid matter which contributes to the generation of the flatulences. For this purpose, first derivative, discutient, and evacuating clysters are to be used, such as those prepared of hyssop, clary, flowers of common and roman chamomile, tops of yarrow, juniper-berries, and the larger carminative seeds, with veal broth, adding a sufficient quantity of sal gemme, sal ammoniac, or Epsom salt, and the oil of chamomile. But it is to be observed, that one or two clysters are not sufficient for removing the disorder, but they are to be frequently repeated. With these are to be interposed laxatives, possessed of a carminative, and, at the same time, somewhat of an anodyne quality. Or, if the patient is strong, and the inflation a real tympanites, two parts of the extractum panchymagogum crollii, with one part of the pilulæ wildegansii, or of the pilulæ stæckii, or pilulæ de styrace, in some very spirituous carminative water, is to be exhibited. See the article FLATULENCY.

After these are to be used medicines possessed of a moderate balsamic principle, and a volatile, oleous, and aromatic salt, commonly called carminatives; but the operation of these medicines is not to be so explained, as if by their subtle volatile salt they attenuate the matter of the flatulences and rendered it thinner; but rather, because, by invigorating the tone

and systole of the intestinal coats, they hinder the stagnation of the flatulences, move them from their seat, and render them more capable of being easily eliminated, or prevent the generation of new flatulences; for, as the destroyed peristaltic motion of the stomach and intestines is the principal cause of flatulences, so all medicines which have a remarkable virtue in strengthening these parts, are most proper for the removal of this disorder. The best and most approved of this kind, are powders prepared of the roots of wake-robin, zedoary, and white burnet; the digestive salt of sylvius, or vitriolated tartar; cumin seeds, the tops of the lesser centaury, and dried orange-peel, each a drachm, and six drops of the genuine oil of chamomile; or of the oil of cedar, or of the oil of orange-peel; to which, if there is a suspicion of an acid lodged in the primæ viæ, we may commodiously add crabs eyes.

To this class of medicines may be referred the following liquid form: take of the carminative water of Dorncrellius, of the waters of common chamomile and zedoary prepared with wine, each one ounce; of the spiritus nitri dulcis, of the pure oil of caraway, eight drops mixed with two drachms of sugar.

Nor are external remedies, such as liniments applied by way of ointment to the whole epigastric region, to be neglected. The principal ingredients of these liniments ought to be boiled with oils of chamomile and rue, oil of nutmeg and peruvian balsam, with which may be mixed the oils of juniper, caraway, anise, or cumins. But preferable to all others, the liquid balsam of life may be used, which when mixed with three parts of Hungary water, and applied by way of ointment to the abdomen, or laid on with a warm linen-cloth, is found of great efficacy.

TYPE, *typus*, a copy, image, or resemblance of some model. This word is much used among divines, to signify a symbol, sign, or figure of something to come; in which sense it is commonly used with relation to antitype, which is the thing itself, whereof the other is a type or figure. See the article **ANTITYPE**.

TYPE of *Constans*, a formulary or model of faith, published by the emperor Constans, who being a favourite of the monothelites, and exasperated at the little success which the ecsthesis of his uncle Heraclius had met with, published a new formulary in

the manner of an edict in 648, forbidding all persons to make use of the expressions "one" or "two wills in Jesus Christ." Martin I. condemned the type in the lutheran council, anno 649, and the synod made a canon expressly against this heretical model; at which the emperor was so enraged, that he forced the pope into banishment. See the article **ECTHESIS**.

TYPE, among letter-founders and printers, the same with letter. See the articles **LETTER** and **LETTER FOUNDRY**.

TYPE is also used to denote the order observed in the intension and remission of fevers, pulses, &c.

TYPHA, in botany, a genus of the monoeceia-triandria class of plants, having no corolla: the male flowers are arranged into a cylindric amentum; the female flowers form also a cylindric amentum below the male ones; there is no pericarpium, the fruit growing together in great numbers, constitutes a cylinder, in each of which there is a single ovated seed, furnished with a style, and standing upon a seta, which seta stands on a capillary pappus.

TYPHODES, τυφοδης, or τυφος, in medicine, a kind of ardent or burning fever usually attending on erysipelas of any of the viscera. Of this disorder, according to Hippocrates, there are five species. The first is a legitimate continual fever, which impairs the strength, is accompanied with a pain of the belly, and a preternatural heat of the eyes, hinders the patient from looking steadily on any object whatsoever, and renders him unable, in consequence of the violent pain, to speak. The second species begins with a tertian or quartan fever. The patient discharges a great quantity of saliva and worms at his mouth; his eyes are painful, his feet, and sometimes his whole body, are seized with soft swellings. His breast and back are now and then painful; his belly rumbles, his eyes are fierce, he spits a great deal, and his saliva sticks to his throat. The third species is known by intense pains in the joints, and sometimes over all the body; the blood contaminated by the bile, becomes hot, and stagnates in the limbs. The fourth species is known by a violent tension, elevation, and heat of the abdomen, succeeded by a diarrhoea, which sometimes ends in a dropy. The fifth species is not unlike the first. See the article **FEVER**.

TYPHOIDEA, in botany, the same with phleum.

phleum. See the article PHLEUM.

TYPHOMANIA, τυφμανια, in medicine, a disorder of the brain, wherein the patient not being able to sleep, tho' greatly inclined thereto, lies with his eyes shut, talks absurdly, and flings himself this way and that. The typhomania is a kind of combination of a frenzy with a lethargy, and is much the same with a coma vigil. See COMA.

TYPOGRAPHY, the art of printing. See the article PRINTING.

TYRANT, *tyrannus*, among the antients, denoted simply a king or monarch. But the ill use several persons invested with that sacred character made of it, has altered the import of the word, and tyrant now carries with it the idea of an unjust and cruel prince, who invades the people's liberty, and rules in a more despotical manner than the laws of nature or the country do allow of.

TYRE, a port-town of Phœnicia, in

Asiatic Turkey, situated on the coast of the Levant, in east long. 36°, north lat. 32° 32', being antiently the capital of Phœnicia.

TYRNAW, a town of Upper Hungary, situated thirty-five miles north-east of Presburg.

TYROCINIUM, a noviciate, or apprenticeship, in any art or science.

TYRONE, an Irish county, in the province of Ulster; bounded by Londonderry, on the north; by Armagh and Lough-neagh, on the east; by Monaghan and Fermanagh, on the south; and by Donnagall on the west.

TYROSIS, a disorder of the stomach, proceeding from milk coagulated therein.

TYSTED, a town of Denmark, in the province of North Jutland, and territory of Alburg, situated on the gulph of Limfjord, fifty miles west of Alburg.

TYTH, or **TITHE**. See **TITHE**.

TYTHING. See the article **TITHING**.



U.

U, or **u**, the twentieth letter, and fifth vowel, of our alphabet, is formed in the voice by a round configuration of the lips, and a greater extrusion of the under one than in forming the letter **o**, and the tongue is also more cannulated. The sound is short in *curst*, *muſt*, *tun*, *tub*; but is lengthened by a final *e*, as in *tune*, *tube*, &c. In some words it is rather acute than long; as in *brute*, *flute*, *lute*, &c. It is mostly long in polysyllables; as in *union*, *curious*, &c. but in some words it is obscure, as in *nature*, *venture*, &c. This letter in the form **V**, or **v**, is properly a consonant, and as such is placed before all the vowels; as in *vacant*, *venal*, *vibrate*, &c. Though the letters **v** and **u** had always two sounds, they had only the form **v** till the beginning of the fourth century, when the other form was introduced, the inconvenience of expressing two different sounds by the same letter having been observed long before. In numerals **V** stands for five; and with a dash added at top, thus **Ṽ**, it signifies five thousand.

In abbreviations, amongst the Romans,

V. A. stood for *Veterani assignati*; **V. B.** *viro bono*; **V. B. A.** *vir boni arbitratus*; **V. B. F.** *vir bonæ fidei*; **V. C.** *vir consularis*; **V. C. C. F.** *vale, conjux charissime, feliciter*; **V. D. D.** *voto dedicatur*; **V. G.** *verbi gratia*; **Vir Ve.** *virgo vestalis*; **V. L.** *videlicet*; **V. N.** *quanto nominum*.

VABRES, a town of Guienne, in France, fifty five miles north east of Toulouse.

VACANCY, in philosophy. See the article **VACUUM**.

VACANCY, in law, a post, or benefice, wanting a regular officer or incumbent.

VACANT EFFECTS, *prædia vacata*, or *vacua*, are such as are abandoned for want of an heir, after the death or flight of their former owner. A romish benefice is said to be vacant in curia Romana, when the incumbent dies in Rome, or within twenty leagues thereof, though it be only by accident that he was there. The pope nominates to all such benefices.

VACATION, in law, is the whole time betwixt the end of one term and the beginning of another. See **TERM**.

This word is also applied to the time from

from the death of a bishop, or other spiritual person, till the bishopric, or dignity, is supplied with another.

VACCA MARINA, the SEA-COW, in zoology, the same with the thrichecus. See the article **THRICHECUS**.

VACCINIUM, in botany, a genus of the octandria-monogynia class of plants, the corolla whereof consists of a single petal, of a campanulated form, and divided into four revolute segments: at the edge the fruit is a globose, umbilicated berry, containing four cells: the seeds are few and small.

This genus comprehends the black whortle-berries and the marsh-whortle.

VACHA, a town of Germany, forty miles south-east of Hesse-Cassel.

VACUUM, or **VACUITY**, in philosophy, denotes a space empty, or devoid, of all matter or body. See the articles **BODY** and **SPACE**.

It has been the opinion of some philosophers, particularly the Cartesians, that nature admits not a vacuum, but that the universe is entirely full of matter: in consequence of which opinion they were obliged to assert, that if every thing contained in a vessel could be taken out or annihilated, the sides of that vessel, however strong, would come together; but this is contrary to experience, for the greatest part of the air may be drawn out of a vessel by means of the air-pump, notwithstanding which it will remain whole, if its sides are strong enough to support the weight of the incumbent atmosphere.

Should it be objected here, that it is impossible to extract all the air out of a vessel, and that there will not be a vacuum on that account; the answer is, that since a very great part of the air that was in the vessel may be drawn out, as appears by the more quick descent of light bodies in a receiver when exhausted of its air, there must be some vacuities between the parts of the remaining air; which is sufficient to constitute a vacuum. Indeed, to this it may be objected by a cartesian, that those vacuities are filled with *materia subtilis*, that passes freely through the sides of the vessel, and gives no resistance to the falling bodies: but, as the existence of this *materia subtilis* can never be proved, we are not obliged to allow the objection, especially since Sir Isaac Newton has found, that all matter affords a resistance nearly in proportion

to its density. See the articles **PLENUM** and **CARTESIAN**.

There are many other arguments to prove this, particularly the motions of the comets through the heavenly regions, without any sensible resistance; the different weight of bodies of the same bulk, &c.

All the parts of spaces, says Sir Isaac Newton, are not equally full; for if they were, the specific gravity of the fluid which would fill the region of the air, could not, by reason of the exceeding great density of its matter, give way to the specific gravity of quicksilver, gold, or any body, how dense soever: whence neither gold, nor any other body, could descend in the air; for no body can descend in a fluid, unless it be specifically heavier than it. But, if a quantity of matter may, by rarefaction, be diminished in a given space, why may it not diminish in infinitum? And if all the solid particles of bodies are of the same density, and cannot be rarified, without leaving pores, there must be a vacuum.

VACUUM BOYLEANUM is sometimes, though improperly, used to express the approach to a real vacuum, by means of an air-pump. See the last article.

VADA, a port-town of Tuscany, ten miles south of Leghorn.

VADARI, in the civil-law, denotes a person to pledge, undertake, or give security, in behalf of another, that he shall, on a certain day, appear in court to prosecute or answer.

VADE-MECUM, or **VENI-MECUM**, a latin phrase, used, in english, to express a thing that is very handy and familiar, and which one usually carries about with them; chiefly applied to some favourite book.

VADIMONIUM, in the civil-law, a promise, or bond, given for appearance before the judge upon a day appointed.

VADO, a port-town of Italy, belonging to the Genoese, thirty six miles south-west of Genoa.

VAENA, a town of Andalusia, in Spain, twenty-five miles south-east of Cordova: west long. 4° 6', north lat. 37° 30'.

VAGABOND, or **VAGRANT**, in law. See the article **VAGRANTS**.

VAGINA, properly signifies a sheath, or scabbard: and the term *vagina* is used, in architecture, for the part of a terminus, because resembling a sheath, out of which the statue seems to issue.

VAGINA,

VAGINA, in anatomy, a large canal, formed of a robust and strong membrane, and reaching from the external orifice, or os pudendi, in women, to the uterus. See **PUDENDA** and **UTERUS**.

The vagina is usually about six or seven fingers breadth long; but is very distensible, and capable of great dilatation; its orifice is narrower than any other part, and closed by a sphincter-muscle: its substance is membranaceous, and rugose internally, and furnished with abundance of nervous papillæ; and to this is owing its quick sensation: externally it is muscular, whereby it is enabled to embrace the penis more closely in coitu. The rugæ are largest in maids, and especially in the anterior part of the vagina; in married women they are much fainter, and seem as if worn down; and in women who have born children, they are almost entirely obliterated. Their use is to encrease the pleasure in coitu, both to the man and to the woman; and to render the part capable of the necessary dilatation in parturition. See **DELIVERY**.

About the mouth of the vagina are found certain lacunæ, or small orifices, capable of admitting a bristle: they proceed from the glandulæ substratæ, and serve to secrete a liquor for lubricating the vagina, and for stimulating to venery. See the article **LACUNÆ**, &c.

The sphincter, or contracting muscle, of the vagina, is composed of a series of muscular fibres, arising from the sphincter of the anus, and surrounding the orifice of the vagina, after which it is inserted under the crura of the clitoris. See the article **CLITORIS**.

The use of the vagina is to receive the penis in coition, to emit from the womb the menstrual discharges, the fœtus, the secundines, and lochia. See the articles **MENSES**, **DELIVERY**, &c.

VAGINALIS, or **ELYTROIDES**, in anatomy. See the article **ELYTROIDES**.

VAGRANTS, in law, are described to be persons pretending to be patent-gatherers, or collectors for prisons, and wander about for that end; among which are included all fencers, bear-wards, common players of interludes, minstrels, jugglers; all persons pretending to be gypsies, or wandering in the habits of such, or pretending skill in physiognomy, palmistry, or the like, or to tell fortunes; all such as use any subtle craft, unlawful games or plays; or, being able in bo-

dy, run away, leaving their wives or children to the parish; all persons who cannot otherwise maintain themselves, that loiter about and refuse to work for the usual wages; and all other persons wandering abroad and begging, &c.

It is enacted, that where any such vagrants shall be found in a parish, the constable, or other officer, is immediately to apprehend them, and carry them before some justice of the peace, who shall examine the persons on oath, as to their condition, and places of abode; and thereupon order them to be sent by pass to the place of their last legal settlement; or if that cannot be known, to the place of their birth. The justice is to give the constable a certificate ascertaining how, and in what manner, they shall be conveyed, &c. And justices of the peace, in their sessions, have power to appoint rates for passing of vagrants, at so much per mile. All constables are to make searches for these people before every quarter-sessions; and in case any persons permit vagrants to lodge in their houses, barns, or out-houses, and do not carry them before the next justice, or give notice to some constable, or other parish-officer, so to do, they shall forfeit a sum not above 40 s. or under 10 s. Also, if any charge be brought upon any place by means thereof, the same may be levied by distress and sale of the offender's goods; for want of which he shall be committed to the house of correction, and there set to hard labour for three months.

VAGUM, or **PAR VAGUM**, in anatomy, the eighth pair of the nerves arising from the medulla oblongata. See **NERVES**.

VAIHINGEN, a town of Swabia, in Germany, situated on the river Neckar, twenty-six miles south-west of Hailbron.

VAIR, in heraldry, a kind of fur, consisting of divers little pieces, argent and azure, resembling a dutch U, or a bell-glass. See plate CCLXXXVIII. fig. 3. Vairs have their point azure opposite their point argent, and the base argent to the base azure.

VAIRY, **VAIRE**, **VERRY**, or **VARRY**, in heraldry, expresses a coat, or the bearings of a coat, when charged or chequered with vairs: and hence, vary-cuppy, or vary-tally, is a bearing composed of pieces representing the tops of crutches. See plate CCLXXXVIII. fig. 4.

VAISON, a town of Provence, in France,

29 miles north-east of Avignon.

VALAIS, a territory of Switzerland, being a long valley of an hundred miles extent, lying between the head of the river Rhone and the lake of Geneva.

VALANTIA, CROSS-WORT, in botany, a genus of the polygamia-monoecia class of plants, the corolla of which is monopetalous, but divided into three or four parts; the stamina are either three or four; the pericarpium is coriaceous and compressed, and contains a single globose seed. See plate CCXC. fig. 1.

VALDENSES, in church-history, the same with the albigenes. See **ALBIGENSES**.

VALENCE, a town of Dauphine, in France, situated at the confluence of the rivers Rhone and Isere, forty-eight miles south of Lyons.

VALENCIA, the capital of a province of the same name, in Spain, situated in a fine plain on the river Guadalaviar: west long. 35', north lat. 39° 20'.

VALENCIA, or **VALENZA DE ALCANTARA**, a town of Estremadura, in Spain, near the frontiers of Portugal: west longitude 7° 30', and north latitude 39° 15'.

VALENCIA is also a town of Terra Firma: west long. 67° 30', north lat. 10°.

VALENCIENNES, a city of french Hainault, situated on the river Schelde, fifteen miles south of Tournay, and eighteen miles south-west of Mons.

VALENTINIANS, in church-history, a sect of christian heretics, who sprung up in the III^d century, and were so called from their leader Valentinus.

The valentinians were only a branch of the gnostics, who realized or personified the platonic ideas, concerning the deity, whom they called Pleroma, or plenitude.

Their system was this: the first principle is Bythos, i. e. depth, which remained many ages unknown, having with it Ennoe, or thought, and Sige, or silence; from these sprung the Nous, or intelligence, which is the only son, equal to, and alone capable of comprehending, the Bythos; the sister of Nous they called Aletheia, or truth: and these constituted the first quaternity of æons, which were the source and original of all the rest: for Nous and Aletheia produced the World and Life; and from these two proceeded Man and the Church. But besides these eight principal æons, there were twenty-two more, the last of which, called Sophia, being desirous to arrive at the knowledge of Bythos, gave herself a great deal of uneasiness, which created in

her Anger and Fear, of which was born Matter. But the Horos, or boulder, stopped her, preserved her in the Pleroma, and restored her to her perfection. Sophia then produced the Christ and the Holy Spirit, which brought the æons to their last perfection, and made every one of them contribute their utmost to form the Saviour. Her Enthymese, or thought, dwelling near the Pleroma, perfected by the Christ, produced every thing that is in the world, by its divers passions. The Christ sent into it the Saviour, accompanied with angels, who delivered it from its passions, without annihilating it; from thence was formed corporeal matter. And in this manner did they romance, concerning God, nature, and the mysteries of the christian religion.

VALENZA, a town of Italy, situated on the river Po, forty-three miles south-west of Milan.

VALERIAN, *valeriana*, in botany, a genus of the triandria-monogynia class of plants, the flower of which consists of a single petal, in form of a tube, prominent in its inferior part, and containing a honey-juice, divided into five segments at the edge, all which are obtuse; the fruit is a capsule, that splits and falls off; and the seeds are single and oblong. These are the characters of the genus; but there is great variation among the different species.

The valerians may be known, when not in flower, by their roots being scented, and their leaves always standing two at a stalk. The great garden-valerian is an alexipharmic, sudorific, and diuretic. The root is the only part of it used in medicine: this is to be taken up in September, and carefully dried. It is given in powder, in asthma, pleurifies, coughs, obstructions of the liver and spleen, and in the plague, and all malignant and petechial fevers. It is also recommended by some as a vulnerary, and by others as one of the greatest medicines in the world for weaknesses of sight.

The wild valerian-root is much more famous than this, but in a different intention: it is of a strong disagreeable smell, and is given in nervous cases with very great success; there are not wanting instances of persons cured of confirmed epilepsies by it; and in all convulsions it is a very successful medicine.

VALET, a french term, used as a common name for all domestic men servants, employed in the more servile offices, a

grooms

Fig. 2. VALLISNERIA.



Fig. 1. VALANTIA.



Fig. 3. VAPOUR.

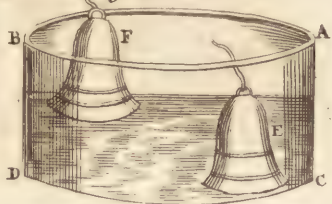
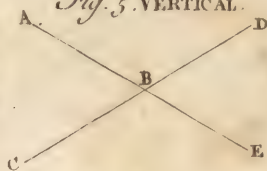


Fig. 4. VERT.



Fig. 5. VERTICAL.







grooms, footmen, coachmen, &c. But with us, it is only used in the phrase *valet de chambre*, which is a servant whose office is to dress and undress his master, &c.

VALET, in the manege, a stick armed at one end with a blunted point of iron, to prick and aid a leaping horse.

VALETUDINARY, *valetudinarius*, among medical writers, denotes a person of a weak and sickly constitution, and frequently out of order.

VALID, in law, an appellation given to acts, deeds, transactions, &c. which are clothed with all the formalities requisite to their being put into execution, and to their being admitted in a court of justice. See the articles **ACT**, **DEED**, &c.

VALKENBURG, or **FAUQUEMONT**, a town of the austrian Netherlands, nine miles east of Maastricht.

VALKOWAR, a town of Slavonia, situated on the Danube, sixty miles north-west of Belgrade.

VALLADOLID, a city of Old Castile, in Spain, eighty-six miles north-west of Madrid: west long. $4^{\circ} 50'$, and north lat. $41^{\circ} 36'$.

VALLADOLID is also a town of Mexico, situated in the province of Honduras: west long. 91° , and north lat. 14° .

VALLAR CROWN, *vallis coronæ*, in roman antiquity, the same with that otherwise called *castrensis*. See the article **CROWN**.

VALLENGIN, the capital of a county of the same name, in Switzerland, situated near the lake of Neufchâtel, twenty-five miles north-west of Bern.

VALLERY, or *St. VALLERY*, a port-town of Picardy, in France, situated on the English channel, forty-five miles north of Rouen.

VALLISNERIA, in botany, a genus of the dioecia-diandria class of plants, with a monopetalous tripartite flower; its fruit is a long, cylindraceous, and unilocular capsule, containing numerous oval seeds. See plate **CCXC**, fig. 2.

VALOIS, a dutchy of France, situated on the three great rivers the Seine, the Marne, and the Oyse.

VALONA, a port-town of Albania, in european Turkey, situated on a fine bay of the gulph of Venice: east long. $20^{\circ} 5'$, and north lat. $41^{\circ} 6'$.

VALPARISA, a port-town of Chili, situated on the Pacific ocean, in west long. 77° , and south lat. 33° .

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VALTELINE, a fine fruitful valley, in the south-east division of the country of the Grisons.

VALUE, *valor*, in commerce, denotes the price or worth of any thing: hence the intrinsic value denotes the real and effective worth of a thing, and is used chiefly with regard to money, the popular value whereof may be raised and lowered, at the pleasure of the prince; but its real, or intrinsic value, depending wholly on its weight and fineness, is not at all affected by the stamp or impression thereon.

Value in bills of exchange, is used to signify the nature of the thing (as ready money, bills, debts, merchandizes, &c.) which is given, as it were, in exchange, for the sum specified in the bill. From four different manners of expressing this value, some distinguish four kinds of bills of exchange. The first bears value received, simply and purely, which comprehends all kinds of value; the second value received in money or merchandize; the third value of myself; and the fourth understood. See the article **BILL**.

VALVE, *valvula*, in hydraulics, pneumatics, &c. is a kind of lid, or cover, of a tube or vessel, so contrived as to open one way; but which, the more forcibly it is pressed the other way, the closer it shuts the aperture; so that it either admits the entrance of a fluid into the tube or vessel, and prevents its return; or admits its escape, and prevents its re-entrance. See the article **PUMP**.

Mr. Belidore has invented a new kind of valves, the description of which may not be unacceptable to the reader. See plate **CCXCI**, where fig. 1. represents a round plate of brass, one half of which is chamfered upwards, and the other half downwards. The part **CAD**, which is greater by one twelfth than the other part **B**, is tapered on the under side from **L** to **A**, as is more evident in fig. 5. *ibid.* where the same letters are used. The part **B**, is tapered on the upper side, as may also be seen in fig. 7. at **BM**. On the upper side of this plate, nearer **B** than the center **G**, is screwed on an axis **EHF**, on which the plate turns. Fig. 2. shews how this axis is fastened to the plate. Fig. 3. represents the box, or bed, of the valve, chamfered downward on all the semi-circular side **L**, to receive the part **AL**, of fig. 1. and the other part **B**, quite to **AA**, where the pivots

19 C

ef

of the axis rest, is chamfered upwards, to receive the part B, of fig. 1. coming up against it. From these chamfered edges on the inside, this bed of the valve spreads into a flat ring, to be pinched between the flaunches of the pipes, which are screwed together, to make all tight. Fig. 4. represents the section of this bed; O P being its upper part chamfered downwards, to receive G L A, the greater part of the valve of fig. 1. falling upon it; and Q R chamfered upwards, receives the smallest part B, of fig. 1. rising against it as it shuts. The valve, thus shut in its bed, is represented in fig. 5. where it may be observed, that the pivots of the axis are kept in their places by semi-circular bridles, that go over them at C and D. The section of the same valve shut, may be seen in fig. 6. where M B H G, represents the lower and lesser part of the valve shut, and applied upwards to the under part of the bed at Q R; and L A G H represents the greater part of the valve shut and applied downwards to the bed at O P. K shews one of the bridles pinned, which holds down the pivots, or ends of the axis. Fig. 7. shews the valve open, and the manner of its play; where all the passage being open between Q K and B I L, and between P O and M H A, it is plain that here is the greatest water-way possible. Now when the valve shuts, the end B M moves in the direction of the pricked curve line M Q, and the end L A in the direction of the pricked line L O. When the water is coming downwards, it must push hard on the part G A L, in fig. 1, 5, 6, and 7. and thereby make the part B H to rise, by which means the valve will be close shut. But when the water comes upwards, as it presses with most force on the surface G A, the part H B will come down, and the valve will immediately open.

VALVE, in anatomy, a thin membrane applied on several cavities and vessels of the body, to afford a passage to certain humours going one way, and prevent their reflux towards the place from whence they came. The veins and lymphatics are furnished with valves, which open towards the heart, but keep close towards the extremities of those vessels; that is, they let the blood and lymph pass towards the heart, but prevent their returning towards the extreme parts from whence they came. See the article **VEIN**, **HEART**, **ARTERY**, &c.

The upper and, as it were, the lid of the isthmus, between the testes and the first vermicular process of the cerebellum, is called the *valvula magna*, or the great valve of the brain. Its use is to prevent the lymph from falling on the nerves, at the base of the cranium. See **BRAIN**.

The colon has a thick valve to prevent the excrements from passing into the ilion, and several other valves to retard the descent of the excrements. See the articles **COLON** and **EXCREMENTS**.

For the valve of the pylorus, see the article **STOMACH**.

For the semilunar valves, see the article **SEMILUNAR**.

For that remarkable valve in a foetus, called by Cheselden the *valvula nobilis*, see the article **FOETUS**.

For the connivent valves, see the article **CONNIVENT**.

VALVERDE, a town of Portugal, situated near the frontiers of Spanish Estremadura, twenty-seven miles north of Alcantara.

VAN, **VANT**, or **VAUNT**, a term derived from the french *avant*, or *avaunt*, signifying *before*, or *foremost* of any thing: thus we say, the van-guard of an army, &c. See the article **GUARD**.

VAN is also the name of a city of Asiatic Turkey, situated on a lake of the same name, in the province of Turcomania: east long. 44° 30', and north lat. 38° 30'.

VANDALIA, the antient name of the countries of Mecklenburg and Pomerania, in Germany.

VANELLUS, the *LAPWING*, in ornithology, the black-breasted tringa, with a hanging crest. See the article **TRINGA**. This species is about the size of the common pigeon; the head is small, but very beautiful, a little depressed on the crown, but not at all on the sides; the eyes are bright and piercing; the head is elegantly variegated, and is ornamented with a beautiful crest hanging over the hinder part of the neck.

VANES, on mathematical instruments, are sights made to move and slide upon cross-staves, fore-staves, quadrants, &c. See the article **CROSS-STAFF**, &c.

VANILLA, in botany, the name by which many call the black-flowered and sweet-podded epidendrum. See **EPIDENDRUM**. In commerce, &c. the term vanilla is chiefly applied to the pod of this plant, which is brought to us entire, and with the seeds in it; being usually about five or six inches long, and half an inch broad, and

and containing an almost innumerable quantity of minute and glossy black seeds. Vanilla grows in the warmer parts of America, and that usually in places where there is water near. The natives distinguish it into three kinds, which the Spaniards call the pompona, the ley, and the simarona. The pods of the pompona-kind are thick and short; those of the kind called ley, are longer and slenderer; and those of the simarona, which is also called bastard-vanilla, are the smallest of all the kinds. The ley kind is the only good vanilla. It ought to be of a good reddish brown, neither too black nor too red, and neither too dry, nor too moist; when perfect, they always appear full, though dry; and a parcel of fifty in number ought to weigh above five ounces. There is a kind which is larger, fifty pods of which usually weigh eight ounces; this is called the *sobre buena*, and is esteemed of all others the most excellent. The smell of vanillas ought to be penetrating and agreeable. And when the pods are fresh, and in good condition, they are found, when opened, to be full of a blackish, oily, balsamic liquor, in which there swim a great number of very small black seeds. The smell, when the pod is fresh opened, is very lively, and in some degree intoxicating.

The pompona-vanilla has a stronger but less agreeable smell than the former; and, when taken, gives men violent headaches, and women disorders of the womb. The liquid substance in the pompona is thinner than in the ley, and the seeds much larger, being nearly of the size of those of mustard.

The simarona, or bastard-vanilla, has very little liquor, has few seeds in the pod, and has scarce any smell.

The pompona and simarona are no saleable commodities, nor ever brought to market, except cunningly by the Indians, who mix them among the pods of the ley, or true kind. It is not yet certainly known, however, whether these three kinds are the produce of different species of plants, or whether they differ only as to age, or the soil where the plant grows. The time of gathering the pods for sale, is from September to December. They require no other management than to be gathered in a dry season, and laid twenty days, to dry away the superfluous humidity, and, at times, pressing the pods gently with the hands.

Vanillas are accounted cordial, carmina-

tive, stomachic, and restorative; they are also said to be diuretic, and to promote the menses.

VANNES, or **VENNES**, a city of Brittany, in France, situated near the bay of Biscay, fifty miles north west of Nantz.

VAPORARIUM, in chemistry, a vapour-bath; wherein the body, containing the ingredients, is so placed as to receive the fumes of boiling water. See the articles **BATH** and **HEAT**.

VAPOUR, *vapor*, in philosophy, the moist and most volatile particles of bodies, separated by heat, and raised into the atmosphere. See the articles **EXHALATION** and **ATMOSPHERE**.

That vapours are raised from the surface of water, and moist bodies, by the action of the sun's heat, is agreed on by all; but the manner in which this is done, continues still a controverted point among philosophers. If we consult a cartesian upon this head, he immediately tells us, that small particles of water being formed into hollow spheres by the sun's heat, filled with their *materia subtilis*, and by that means becoming lighter than air, are easily buoyed up in it: but as this *materia subtilis* is only a fiction, this solution is not to be regarded. See the article **VACUUM**.

Dr. Nieuwentyt, and several other philosophers who maintain, that fire is a particular substance distinct from other matter, account for the formation and ascent of vapours thus: they say, that the rays of the sun, or particles of fire separated from them, adhering to particles of the water, make up little bodies, lighter than an equal bulk of air; which, therefore, by the laws of hydrostatics, will ascend in it, till they come to an height where the air is of the same specific gravity with themselves; and that rain is produced by the separation of the particles of the fire from those of the water; which last, being then left without support, can no longer be sustained by the air, but falls down in drops of rain. See **RAIN**, **DEW**, &c.

This opinion is liable to the following difficulties: first, fire has never been yet proved to be a distinct element, or a particular substance; and the change of weight in bodies in chemical preparations, heretofore thought to arise from the adhesion of particles of fire, is found to proceed from the adhesion of particles of air. See the articles **FIRE** and **AIR**.

Secondly, should the above-mentioned

supposition be allowed, the fiery particles, which are joined to the watery ones to buoy them up, must be considerably large, or else a very great number must fix upon a single particle of water; and then a person, being on the top of an hill in the cloud, would be sensible of the heat, and find the rain, produced from that vapour, much colder than the vapour itself: whereas the contrary is evident to our senses; the tops of hills, though in the clouds, being much colder than the rain which falls below.

Besides, the manner in which the particles of water should be separated from those of the fire, so as to fall in rain, is not easily to be conceived.

The most generally received opinion is, that by the action of the sun on the surface of the water, the aqueous particles become formed into bubbles, filled with a flatus, or warm air, which renders them specifically lighter than common air, and makes them rise therein, till they meet with such as is of the same specific gravity with themselves. But Mr. Rowning asks, First, How comes the air in the bubbles to be specifically lighter than that without, since the sun's rays, which act upon the water from whence they are raised, are equally dense over all its surface?

Secondly, If it could be possible for rarer air to be separated from the denser ambient air, to form the bubbles (as bubbles of soaped water are blown up by warm air from the lungs, whilst the ambient air is colder and denser) what would hinder the external air from reducing that, which is inclosed in the bubbles, immediately to the same degree of coldness and specific gravity with itself (cold being readily communicated thro' such thin shells of water); by which means the bubbles would become specifically heavier than the circumambient air, and would no longer be supported therein, but fall down, almost as soon as they were formed?

Thirdly, If we should grant all the rest of the supposition, yet the following difficulty will still remain. If clouds are made up of bubbles of water filled with air, why do not these bubbles always expand, when the ambient air is rarefied, and presses less upon them than it did before; and why are they not condensed, when the ambient air is condensed by the accumulation of the superior air? But if this condensation and rarefaction should happen to them, the clouds would always

continue at the same height, contrary to observation; and we should never have any rain.

The two last opinions are more largely examined by Dr. Desaguliers in the Philosophical Transactions, n^o 407. After which, he endeavours to establish one of his own.

He observes, with Sir Isaac Newton, that when by heat or fermentation the particles of a body are separated from their contact, their repulsive force grows stronger, and the particles exert that force at greater distances; so that the same body should be expanded into a very large space, by becoming fluid; and may sometimes take up more than a million of times the room it did in a solid and incompressible state. "Thus, says he, if the particles of water are turned into vapour, by repelling each other strongly, and repel air more than they repel each other; aggregates of each particles, made up of vapour and vacuity, may arise in air of different densities, according to their own density depending on their degree of heat." He observes farther, that heat acts more powerfully on water, than on common air; for that the same degree of heat, which rarefies air two-thirds, will rarefy water near fourteen thousand times, changing it into steam or vapour, as it boils it. And in winter, that small degree of heat, which, in respect of our bodies, appears cold, will raise a steam or vapour from water, at the same time that it condenses air. Lastly, he observes, that the density and rarity of this vapour depends chiefly on its degree of heat, and but little on the pressure of the circumambient air. From all which he infers, that the vapour being more rarefied near the surface of the earth, than the air is there by the same degree of heat, must necessarily be buoyed up into the atmosphere; and since it does not expand itself much, though the pressure of the incumbent air grows less, at length it finds a place where the atmosphere is of the same specific gravity with itself, and there floats, till, by some accident or other, it is converted again into drops of water, and falls down in rain.

And to shew that air is not necessary for the formation of steam or vapour, he gives us this experiment; ABCD (plate CCXC, fig. 3.) is a pretty large vessel of water, which must be set upon the fire to boil. In this vessel must be suspended the glass bell E, made heavy enough

enough to sink in water ; but put in, in such a manner, that it be filled with water, when upright, without any bubbles of air at its crown within, the crown being all under water. As the water boils, the bell will, by degrees, be emptied of its water, the water in the bell being pressed down by the steam which rises from it ; but, as that steam has the appearance of air, in order to know whether it be air or not, take the vessel off the fire, and draw up the bell by a string fastened to its knob or top, till only the mouth remains under water ; then, as the steam condenses by the cold air on the outside of the bell, the water will rise up into the bell at F, quite to the top, without any bubble above ; which shews, that the steam, which kept out the water, was not air.

APOURS, in medicine, a disease properly called hypo, or the hypochondriacal disease, and in men, particularly, the spleen. See **HYPOCHONDRIAC PASSION**.

ARI, in medicine, little hard and ruddy tumours, which frequently infest the faces of young persons of a hot temperament of body ; for curing which cathartics, and a cooling diluting diet are most proper.

ARIABLE QUANTITIES, in geometry and analytics, denote such as are either continually increasing or diminishing ; in opposition to those which are constant, remaining always the same. See the articles **QUANTITY** and **FLUXION**.

ARIANCE, in law, is an alteration of something formerly laid in a plea : but where a plea is good in substance, it is held, that a small variance shall not hurt it. Where the defendant pleads variance between a writ and declaration, he must craveoyer of the writ before he shall take any advantage thereof ; and this is because the writ and the declaration are not upon the same roll : it is likewise observed, that if in one roll a declaration is entered as in debt, and in another as in trespass, this is such a variance, that if the plaintiff has judgment it shall be reversed.

By the 16 and 17 Car. II. c. 8. all variances, &c. that are not against the right of the matter of the suit, shall be amended.

ARIATION, in geography and navigation, is the deviation of the magnetical needle, in the mariner's compass, from the true north point, towards either the east or west ; or it is an arch of the horizon, intercepted between the meri-

dian of the place of observation and the magnetic meridian. See **NEEDLE**.

The cause of this variation of the needle has remained hitherto without any demonstrative discovery ; yet since its declination, and inclination (or dipping) do both of them manifestly indicate the cause to be somewhere in the earth, it has given occasion to philosophers to frame hypotheses for a solution, which make the earth a large or general magnet or loadstone, of which all the lesser ones are but so many parts or fragments, and being possessed of the same virtue, will, when left to move freely, have the same disposition and similarity of position, and other circumstances. See **EARTH** and **MAGNET**. The most considerable of these hypotheses is that of the late sagacious Dr. Halley, which is this : the globe of the earth is one great magnet, having four magnetical poles or points of attraction, near each pole of the equator two ; and that in those parts of the world which lie near adjacent to any one of those magnetical poles, the needle is chiefly governed thereby, the nearest pole being always predominant over the more remote one. Of the north poles, that which is nearest to us, he supposes to be in the meridian of the Land's-end, which governs the variations in Europe, Tartary, and the North-sea ; the other he places in a meridian passing through California, about 15° from the north pole of the world, which governs the needle in north America, and the oceans on either side. In like manner he accounts for the variations in the southern hemisphere. See *Philos. Trans.* n° 148.

The variation of the needle from the north and south points of the horizon, not being the same, but variable in different years, and in a diverse manner in different parts of the earth, made the doctor farther conjecture, that two of the magnetic poles were fixed, and two moveable ; and in order to make this out, he supposes the external part of the earth to be a shell or cortex, containing within it a magnetic moveable nucleus of a globular form, whose center of gravity is the same with that of the earth, and moveable about the same axis.

Now, if the motions of both the shell and nucleus were the same, the poles of each would always have the same position to each other ; but he supposes the motion of the nucleus to be a very small matter

less

less than that of the shell, which yet is scarce sensible in 365 revolutions; and, if so, the magnetic poles of the nucleus will by slow degrees change their distance from the magnetic poles of the shell, and thus cause a variation in that needle's variation, which is governed by the moveable pole of the nucleus, while that variation which respects the fixed poles of the magnetic shell remains more constant; as in Hudson's-bay the change is not observed to be near so fast as in these parts of Europe.

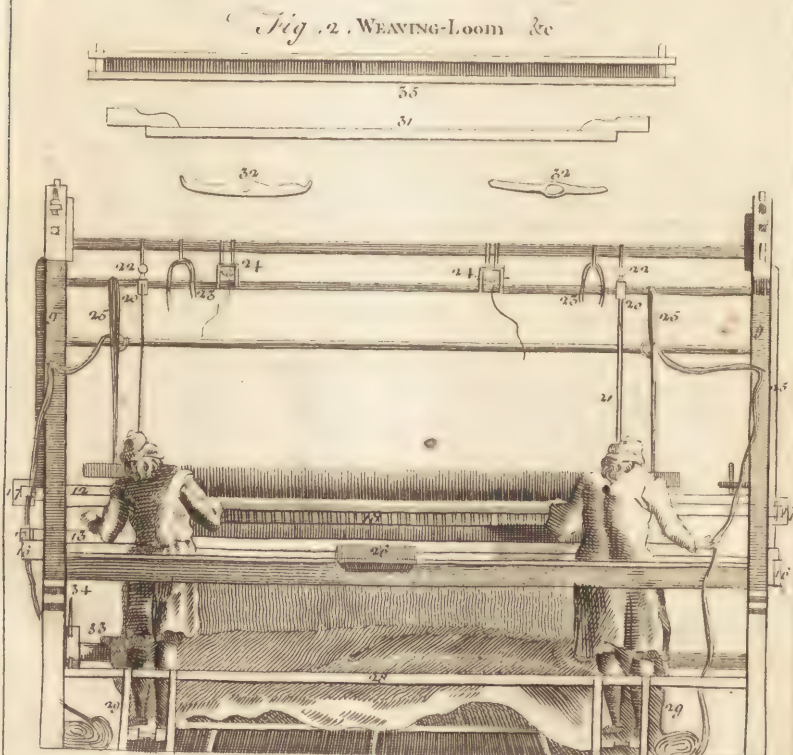
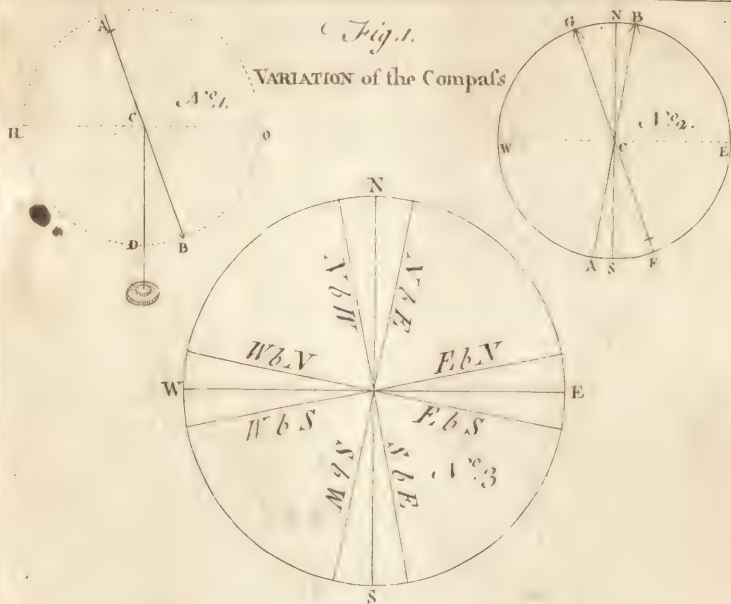
What seems a little strange is, that the doctor has no where undertook to account for the dipping of the needle by this hypothesis; though the invention of this (by Mr. Blagrove) was before that of the change of the needle's variation (by Mr. Gellibrand); nor does it appear which way this phenomenon is explicable by it. But we have not yet so many accurate observations of the needle's inclination as we have of its variation, which is its only usual property. By several experiments Mr. Graham has very accurately made, it appears, that the quantity of the needle's inclination to the horizontal line, was an angle of about 74 or 75 degrees: that is, suppose A B (plate CCXCII. fig. 1. n° 1.) a touched needle supported on the point C, of the pin C D, it will remain an angle A C H, or B C O, with the horizontal line H O of 74 or 75 degrees.

The variation of the needle has within a century past undergone a remarkable alteration; for at London it was observed by Mr. Burrows, in the year 1580, to be $11^{\circ} 15'$ east; that is, if N. S. (*ibid.* n° 2.) represent the north and south points of the horizon, and E. W. the east and west points, the needle then had the situation A B, so that the arch B N = $11^{\circ} 15'$. After that, in the year 1622, it was observed by Mr. Gunter to be but 6° east. In the year 1634, Mr. Gellibrand observed it to be $4^{\circ} 5'$ east. In 1657, it was observed by Mr. Bond to be nothing at all, that is the needle placed itself in the situation S. N. and pointed directly to the north. After this, in the year 1672, Dr. Halley observed it to be $2^{\circ} 30'$ westward; and again, in the year 1692, he found it 6° west. Since then, in the year 1723, Mr. Graham, by most accurate experiments, found it to be $14^{\circ} 13'$, and at present it is between 15° and 16° ; and in some places it is found 18° westward.

The variation of the declination and inclination of the needle is variable, and subject to no regular computation. While the quantity of both sorts of variation in the several parts of the world, is shewn in Dr. Halley's map of the world, it is proved from the observations of Newton's Pound.

If the sun's true amplitude or azimuth found by calculation, agree with the magnetic amplitude or azimuth, found by observation, it is evident there is no variation: but if they disagree, and the true and observed amplitudes, at the rising or setting of the sun, be both of the same name; that is, either both north or both south, their difference is the variation; whereas, if they be of different names, *i. e.* one north and the other south, their sum is the variation. Again, if the true and observed azimuths be both of the same name, *i. e.* both east or both west, their difference is the variation; but if they be of different names, their sum is the variation: and to know whether the variation be easterly or westerly, observe the following general rule; the observer's face be turned towards the sun, then if the true amplitude or azimuth be to the right-hand, the variation is easterly; but if to the left, westerly. To illustrate this, let N E S W. (*ibid.* n° 3.) represent a compass; and suppose the sun is really E b S at the time of observation, but the observer sees him off the east point of the compass, and the true amplitude or azimuth of the sun is to the right of the magnetic, or observed: here it is evident, that the E b S point of the compass ought to lie where the east point is, and so the north where the N b W is; consequently the north point of the compass is a point too east, *i. e.* the variation in this case is easterly. The same will hold when the amplitude or azimuth is taken on the west-side of the meridian.

Again, let the true amplitude or azimuth be to the left-hand of the observed; thus suppose the sun is really E b N at the time of observation, but the observer sees him off the east point of the compass, and so the true amplitude or azimuth is to the left of the observed: here it is evident, that the E b N point of the compass ought to stand where the east point is, and so the north where the N b W point is; consequently the north point of the compass lies a point too westerly, so in this case the variation





west. The same will hold when the sun is observed on the west-side of the meridian.

Suppose the sun's true amplitude at rising is found to be E. 14° , $20'$ N. but by the compass it is found to be E. 26° , $12'$ N. Required the variation, and which way it is.

Since they are both the same way, therefore,

From the magnetic ampl. E. 26° , $12'$ N.
Take the true amplitude - E. 14° , $20'$ N.

And there remains the varia. 11° , $52'$ E. which is easterly, because in this case the true amplitude is to the right of the observed.

VARIATION of the moon, in astronomy, is the third inequality observed in that planet's motion. See the article MOON.

VARIATION of the variation, is the change in the declination of the needle, observed at different times in the same place.

VARIATION of quantities, in algebra. See the article COMBINATION.

VARIATION of curvature, in geometry, is used for that inequality or change, which happens in the curvature of all curves, except the circle; and this variation or inequality constitutes the quality of the curvature of any line. See the article CURVE.

Sir Isaac Newton makes the index of the inequality or variation of curvature to be the ratio of the fluxion of the radius of curvature to the fluxion of the curve; and Mr. MacLaurin, to avoid the perplexity that different notions, connected with the same terms, occasion to learners, has adapted the same definition; but he suggests, that this ratio gives rather the variation of the ray of curvature, and that it might have been proper to have measured the variation of curvature, rather by the ratio of the fluxion of curvature itself to the fluxion of the curve; so that the curvature being inversely as the radius of the curvature, and consequently its fluxion as the fluxion of the radius itself directly, and the square of the radius inversely, its variation would have been directly, as the measure of it, according to Sir Isaac's definition, and inversely, as the square of the radius of curvature.

VARIATION, in music, is understood of the different manners of playing or singing a tune or song, whether by subdividing the notes into several others of lesser value, or by adding graces, &c. in such manner, however, as that one may still discern the ground of the tune

through all the enrichments; which are called embroideries.

VARICIFORMES PARASTATÆ, in anatomy, a name which some authors give to two vessels near the bladder, by reason of their many turnings, serving to work and prepare the seed the better. See *PARASTATÆ* and *DEFERENTIA VASA*.

VARICOSUM CORPUS, in anatomy, the same as *corpus pyramidale*. See the article *PYRAMIDALIA CORPORA*.

VARIEGATION, among botanists and florists, the act of streaking or diversifying the leaves, &c. of plants and flowers with several colours.

Variegation is either natural or artificial.

Of natural variegation there are four kinds; the first shewing itself in yellow spots here and there, in the leaves of plants, called, by gardeners, the yellow bloach. The second kind, called the white bloach, marks the leaves with a great number of white spots, or stripes; the whitest lying next the surface of the leaves, usually accompanied with other marks of a greenish white, that lie deeper in the body of the leaves. The third, and most beautiful, is where the leaves are edged with white, being owing to some disorder or infection in the juices, which stains the natural complexion or verdure of the plant. The fourth kind is that called the yellow edge.

Artificial variegation is performed by inarching or inoculating a striped or variegated plant into a plain one of the same sort; as a variegated common jessamin into a plain, common, spanish, brazil, or indian jessamin.

A single bud or eye, Mr. Bradley observes, being placed in the escutcheon of a distempered tree, where it can only receive nourishment from the vitiated juices, will become variegated proportionably to the nourishment it draws, and will partake more of the white and yellow juice, than if a branch should be inarched, the bud having nothing to nourish it but the juices of the plant it is inoculated on; whereas a cyon inarched is fed by the striped plant, and the healthful one.

As to the natural stripes or variegations, there are some particular circumstances to be observed: 1. That some plants only appear variegated or bloached in the spring and autumn, the stains disappearing as they gather strength: of this kind are rue, thyme, and marjoram. 2. Some plants are continually bloached in the spongy part of their leaves: the sap-vessels,

vessels, all the time, remaining of a healthful green : such are the alternus, orange-mint, &c. which, being strengthened by rich manure, or being inarched in healthful plants, throw off the distemper. 3. In other plants, the disease is so rooted and inveterate, that it is propagated with the seed : such are the archangel, water-betony, bank-cress, borrag, striped cellary, and sycamore ; the sides of which produce striped plants.

VARIOLÆ, the **SMALL-POX**, in medicine. See the article **POX**.

VARIORUM, or *cum notis VARIORUM*, in matters of literature, denotes an edition of a classic author, with notes of divers authors thereupon : these editions are generally most valued.

VARIX, in medicine, the dilatation of a vein, arising from the too great abundance or thickness of the blood ; the cure of which is to be attempted by evacuations, as phlebotomy and cathartics ; as also by external applications, as discutient fomentations, cataplasms, embrocations, &c. or, where the case grows dangerous, by incision.

VARNA, a town of Bulgaria, in european Turkey, situated on the western coast of the Black-sea, an hundred and twenty miles north of Constantinople.

VARNISH, or **VERNISH**, a thick, viscid, shining liquor, used by painters, gilders, and various other artificers, to give a gloss and lustre to their works ; as also to defend them from the weather, dust, &c. There are several kinds of varnishes in use ; as the siccativ or drying varnish, made of oil of aspin, turpentine, and sandarach melted together. White varnish, called also venetian varnish, made of oil of turpentine, fine turpentine, and mastic. Spirit of wine varnish, made of sandarach, white amber, gum elmi, and mastic ; serving to gild leather, picture-frames, &c. withal. Also the gilt-varnish, china-varnish, common-varnish, &c.

1. To make the white varnish : take gum sandarach, of the clearest and whitest sort, eight ounces ; gum mastic, of the clearest sort, half an ounce ; of sarco-colla, the whitest, three quarters of an ounce ; venice-turpentine, an ounce and a half ; benzoin, the clearest, one quarter of an ounce ; white rosin, one quarter of an ounce ; gum animæ, three quarters of an ounce : let all these be dissolved, and mixed in the manner following :

Put the sarco-colla and rosin into a more spirits than will cover them to solve ; then add the benzoin, gum animæ and venice-turpentine, into either a glass or glazed earthen vessel, and pour as much spirits as will cover them an inch ; then put the gum-mastic into a glass or glazed vessel, and pour spirits upon it, covering it also about an inch thick, to dissolve it rightly ; then put your gum elemi into a distinct vessel as before, and cover it with spirits to dissolve.

For this purpose, you need only beat the rosin a little, and powder the gum animæ, sarco-colla, and benzoin.

Let all stand three or four days to solve, shaking the glasses, &c. two three times a day, and afterwards pour them all together into a glazed vessel, stirring them well, and strain the liquor and gums gently, beginning with the gums, through a linen-cloth.

Then put it into a bottle, and let it stand a week before you use it, and pour off much of the clear only, as you think sufficient for present use.

2. The white amber-varnish is made according to Mr. Boyle : take white rosin four drams, melt it over a fire in a clean glazed pipkin ; then pour into it two ounces of the whitest amber you can get, finely powdered. This is to be put in by a little and a little, gradually, keeping it stirring all the while with a small stick, over a gentle fire, till it dissolves, pouring in now and then a little oil of turpentine, as you find it growing stiff ; and continue so to do till all your amber is melted.

But great care must be taken not to set the house on fire, for the very vapour of the oil of turpentine will take fire if heated only ; but if it should happen to do, immediately put a flat board or blanket over the fiery pot, and by keeping the air from it you will put it out, or suffocate it.

Therefore it will be best to melt the rosin in a glass of a cylindric figure, in a pot of hot sand, after the glass has been annealed, or warmed by degrees in sand, under which you must keep a gentle fire.

When the varnish has been thus melted, pour it into a coarse linen-bag, and press it between two hot boards of oak or plates of iron ; after which it may be used with any colours in painting,

also for varnishing them over when painted.

But for covering gold, you must use the following varnish: mean time, it is to be observed, that when you have varnished with white varnish, you may put the things varnished into a declining oven, which will harden the varnish.

3. A hard varnish that will bear the muffle, may be thus made: take of colophony, an ounce; set it over the fire in a well-glazed earthen vessel, till it is melted; then by little and little, strew in two ounces of powder of amber, keeping it stirring all the while with a stick; and when you perceive it begin to harden or resist the stick, then put in a little turpentine oil, which will thin and soften it immediately; then put in two ounces of gum copal, finely powdered, sprinkling it in as you did the amber, now and then pouring in a little oil of turpentine; and when it is done, strain it as before directed.

This is proper to varnish over gold; and the things done with it must be set into a declining oven, three or four days successively, and then it will resist even the fire itself.

4. To make a varnish for brass, that will cause it to look like gold. Take two quarts of spirit of wine, and put it into a retort-glass; then add to it an ounce of gamboge, two ounces of lacca, and two ounces of mastic; set this in a sand-heat for six days, or else near a fire, or you may put the body of the bolt-head frequently into warm water, and shake it two or three times a-day; then set it over a pan of warm saw-dust. But before this varnish is laid over the metal, let it be well cleaned.

This is a good varnish to mix with any colours that incline to red, and the amber-varnish for mixing with those that are pale.

5. To make a varnish for gold, or metals made in imitation of gold. Take colophony, and, having melted it, put in two ounces of amber finely powdered, and some spirit of turpentine, and, as the amber thickens, keep it well stirring; then put in an ounce of gum elemi, well pulverized, and more spirit of turpentine; constantly stirring the liquor till all is well mixed and incorporated: but take care, however, to use as little turpentine as you can, because, the thicker the varnish is made, the harder it will be. Let

this be done over a sand-heat, in an open glass; then strain it, as is directed for the preceding varnish. This varnish is to be used alone, first warming the vessels made of paper-paste; and lay it on with a painting-brush before the fire, but not too near, lest the fire raise it into blisters. After this has been done, harden it three several times in ovens; first with a slack heat, the next with a warmer, and the third with a very hot one; and the vessels will look like polished gold.

And as for such vessels, &c. as shall be made with saw-dust and gums, the varnish may be made of the same ingredients as above-mentioned, except the gum elemi; and this will dry in the sun, or in a gentle warmth.

6. To make a varnish for any thing covered with leaf-silver. First paint the thing over with size, and ground chalk or whiting; let them stand till they are thoroughly dry, and then do them over with very good gold-size, of a bright colour (for there is much difference in the colour of it; some being yellow, and others almost white; the first is most proper for gold, and the last for silver.) When this size is so dry as that it will just stick a little to the touch, lay on the leaf-silver, and close it well to the size.

7. To make a varnish for silver. Melt, in a well glazed pipkin, some fine turpentine, and put in three ounces of white amber, finely powdered (more or less, according to the quantity your work will require) put it in by little and little, keeping it continually stirring, adding by degrees some spirit of turpentine, till all the amber is dissolved; and then add to it an ounce of sarcocolla well beaten, and an ounce of gum elemi well levigated, adding now and then a little spirit of turpentine, till all is dissolved: do this over a gentle fire, and keep it constantly stirring.

This varnish will be as white and strong as the former; and is to be used warm, and hardened by degrees in an oven, as varnished gold, whereby it will look like polished silver.

Laying on of VARNISHES. 1. If you varnish wood, let your wood be very smooth, close-grained, free from grease, and rubbed with rushes. 2. Lay on your colours as smooth as possible; and, if the varnish has any blisters in it, take them off by a polish with rushes. 3.

While you are varnishing, keep your work warm, but not too hot. 4. In laying on your varnish, begin in the middle, and stroke the brush to the outside; then to another extreme part, and so on till all be covered; for if you begin at the edges, the brush will leave blots there, and make the work unequal. 5. In fine works use the finest tripoli in polishing: do not polish it at one time only; but, after the first time, let it dry for two or three days, and polish it again for the last time. 6. In the first polishing you must use a good deal of tripoli, but in the next a very little will serve: when you have done, wash off your tripoli with a sponge and water: dry the varnish with a dry linen-rag; and clear the work, if a white ground, with oil and whiting; or, if black, with oil and lamp-black.

VARNISH also signifies a sort of shining coat, wherewith potter's ware, delft-ware, china-ware, &c. are covered, which gives them a smoothness and lustre. Melted lead is generally used for the first, and flint for the second. See the article **GLAZING**.

VARNISH, among medalists, signifies the colours antique medals have acquired in the earth.

The beauty which nature alone is able to give to medals, and art has never yet attained to counterfeit, enhances the value of them; that is, the colour, which certain soils, in which they have a long time lain, tinge the metals withal; some of which are blue, almost as beautiful as the turquoise; others with an inimitable vermilion colour; others with a certain shining polished brown, vastly finer than brass figures.

The most usual varnish is a beautiful green, which hangs to the finest strokes without effacing them, more accurately than the finest enamel does on metals.

No metal but brass is susceptible of this; for the green rust that gathers on silver always spoils it, and it must be got off with vinegar or lemon-juice.

Falsifiers of medals have a false or modern varnish, which they use on their counterfeit's, to give them the appearance, or air, of being antique. But this may be discovered by its softness, it being softer than the natural varnish, which is as hard as the metal itself.

Some deposit their spurious metals in the earth for a considerable time, by which means they contract a sort of varnish, which may impose upon the less know-

ing; others use sal armoniac, and others burnt paper.

VAS, a vessel either for mechanical, chemical, culinary, or any other uses. In anatomy, all the parts which convey a fluid are called vessels, as the veins, arteries, and lymphatics.

VASA CONCORDIÆ, among hydraulic authors, are two vessels, so constructed as that one of them, though full of wine, will not run a drop; unless the other, being full of water, do run also. Their structure and apparatus may be seen in Wolfius Element. Mathes. t. I. Hydraul.

VASCULAR, in anatomy, something consisting of divers vessels; as arteries, veins, nerves, &c. See **ARTERY**, &c.

VASCULIFEROUS PLANTS, such whole seeds are contained in vessels, which are sometimes divided into cells.

VASE, a term frequently used for antient vessels dug from under ground, or otherwise found, and preserved in the cabinets of the curious.

In architecture, the appellation vase is also given to those ornaments placed on corniches, soffits, or pedestals, representing the vessels of the antients, particularly those used in sacrifice; as incense-pots, flower-pots, &c. They serve to crown or finish facades, or frontispieces; and hence called acroteria.

The term vase, however, is more particularly used, in architecture, to signify the body of the corinthian and composite capital; otherwise called the tambour or drum, and sometimes the campana or bell. See the articles **CORINTHIAN** and **COMPOSITE**.

Vase is sometimes also used, among florists, for what is more usually called the calyx, or cup. See the article **CALYX**.

VASSAL, in old law-books, denotes a tenant that held land in fee of his lord, to whom he vowed fidelity and service. See **FEALTY**, **FEE**, **HOMAGE**, &c.

VASSERBURG, or **WASSERBURG**, a town of Bavaria, in Germany, situated on the river Inn, thirty miles east of Munich.

VASTO, in law, a writ that lies for the heir, or him in reversion or remainder, against the tenant for term of life or years, for making waste. See the article **WASTE**.

VASTUS, in anatomy, the name of two of the extensor muscles of the legs; the one, called vastus internus, arises from the whole internal side of the femur; and the other, called vastus externus, takes

its rise from the whole external side of the femur; and both together, with the cruralis and rectus, form a very robust and strong tendon just above the knee, to which the patella adheres behind, and which is inserted below the knee at a tubercle of the tibia. See **MUSCLE**.

VAT, or **FAT**, a vessel for holding wine, ale, beer, cyder, &c. in the time of their preparation.

VATERIA, in botany, a genus of the polyandria-monogynia class of plants, the flower of which consists of five oval and patent petals; and its fruit is a turbinate, coriaceous, and unilocular capsule, containing a single oval seed.

VATICAN, a magnificent palace of the pope, in Rome, which is said to consist of several thousand rooms: but the parts of it most admired are the grand staircase, the pope's apartment, and especially the library, which is one of the richest in the world, both in printed books and manuscripts.

VAUDEMONT, the capital of a county of the same name in Lorraine, fifteen miles south-west of Nancy.

VAUDOIS are certain valleys situated north of the marquise of Saluzzo, in Italy: the chief town is Lucerne. See the article **LUCERNE**.

VAUDREVANGE, a town of Lorraine, situated on the river Sare, fifty miles north-east of Nancy.

VAUGE, high mountains of Alsace in Germany, which separate it from Lorraine on the west.

VAULT, *fofnix*, in architecture, an arched roof, so contrived that the stones which form it sustain each other. See **ARCH**. Vaults are, on many occasions, to be preferred to soffits or flat ceilings, as they give a greater height and elevation, and are besides more firm and durable. See the article **CEILING**.

Simonius observes, that the ancients had only three kinds of vaults. The first was the *fofnix*, made cradle-wise; the second a *testudo*, *i. e.* tortoise-wise, which the French call *cul de four*, or oven-wise; and the third *concha*, or trumpet-wise.

But the moderns have subdivided these three sorts into many more, to which they have given different names, according to their figures and uses; some of them are circular, and others elliptical.

Again, the sweeps of some are larger, others less, portions of a sphere. All such as are above hemispheres, are called high, or surmounted, vaults; and all

that are less than hemispherical, are called low, or surbaied, vaults, or testudines. In some vaults the height is greater than the diameter; in others it is less: others, again, are quite flat, and only made with hausses; others like ovens, or in the form of a *cul de four*, &c. and others growing wider as they lengthen, like a trumpet.

There are also gothic vaults, with ogives, &c. See the article **OGIVE**, &c.

Of vaults some again are single, others double, cross, diagonal, horizontal, ascending, descending, angular, oblique, pendent, &c.

Master VAULTS are those that cover the principal parts of buildings, in contradistinction to the upper or subordinate vaults, which only cover some little part, as a passage or gate, &c.

Double VAULT is one that is built over another, to make the outer decoration range with the inner; or, to make the beauty and decoration of the inside consistent with that of the outside, leaves a space between the concavity of the one and the convexity of the other. Instances of which we have in the dome of St. Peter's at Rome, St. Paul's at London, and in that of the invalids at Paris.

VAULTS with compartments are such whose sweep, or inner face, is enriched with pannels of sculpture, separated by pilasters. These compartments, which are of different figures, according to the vaults, and usually gilt on a white ground, are made with stone or brickwalls, as in the church of St. Peter at Rome, or with plaster on timber-vaults.

Theory of VAULTS. A semi-circular arch or vault, standing on two piers, or imposts, and all the stones that compose them, being cut, and placed in such manner as that their joints or beds, being prolonged, do all meet in the center of the vault; it is evident that all the stones must be in the form of wedges; *i. e.* must be wider and bigger at top: by virtue of which they sustain each other, and mutually oppose the effort of their weight, which determines them to fall.

The stone in the middle of the vaults, which stands perpendicular to the horizon, and is called the key of the vault, is sustained on each side by two contiguous stones, just as by two inclined planes; and, consequently, the effort it makes to fall is not equal to its weight.

But still that effort is the greater, as the inclined planes are less inclined; so that

if they were infinitely little inclined, *i. e.* if they were perpendicular to the horizon as well as the key, it will tend to fall with its whole weight, and would actually fall but for the mortar.

The second stone, which is on the right or left of the key-stone, is sustained by a third, which, by virtue of the figure of the vault, is necessarily more inclined to the second than the second is to the first; and consequently the second, in the effort it makes to fall, employs a less part of its weight than the first. For the same reason, the stones from the key-stone employ still a less and less part of their weight to the last, which, resting on a horizontal plane, employs no part of its weight; or, which is the same thing, makes no effort at all, as being entirely supported by the impost.

Now, in vaults, a great point to be aimed at is, that all the voussoirs, or key-stones, make an equal effort towards falling. To effect this, it is visible, that as each (reckoning from the key to the impost) employs still a less and less part of its whole weight; the first, for instance, only employing one half; the second, one third; the third, one fourth, &c. There is no other way of making those different parts equal, but by a proportionable augmentation of the whole; *i. e.* the second stone must be heavier than the first, the third than the second, &c. to the last; which should be infinitely heavier.

M. de la Hire demonstrates what that proportion is, in which the weights of the stones of a semi-circular arch must be increased to be in æquilibrium, or to tend with equal forces to fall, which is the firmest disposition a vault can have.

The architects before him had no certain rule to conduct themselves by, but did all at random. Reckoning the degrees of the quadrant of a circle, from the key-stone to the impost, the extremity of each stone will take up so much the greater arch as it is farther from the key.

M. de la Hire's rule is to augment the weight of each stone above that of the key stone, as much as the tangent of the arch of the stone exceeds the tangent of the arch of half the key. Now the tangent of the last stone of necessity becomes infinite, and of consequence its weight should be so too; but, as infinity has no place in practice, the rule amounts to this, that the last stones be loaded as much

as possible, that they may the better resist the effort which the vault makes to separate them; which is called the shoot or drift of the vault.

Mr. Parent has since determined the curve, or figure, which the extrados, or outside of a vault, whose intrados, or inside, is spherical, must have, that all the stones may be in equilibrio.

Key of a VAULT is a stone or brick in the middle of the vault, in form of a truncated cone, serving to bind or fasten all the rest. See the article *KEY*.

Reins, or fillings up of a VAULT, are the sides which sustain it.

Pendentive of a VAULT is the part suspended between the arches or ogives. See the article *PENDENTIVE*.

Impost of a VAULT is the stone whereon the first voussoir, or arch-stone of the vault, is laid. See *IMPOST*.

VAUR, a town of Languedoc, in France, eighteen miles west of Toulouse.

UBEDA, a city of Andalusia, in Spain, forty-five miles north-east of Granada: west long. $3^{\circ} 6'$, north lat. 38° .

UBERLINGEN, a town of Swabia, in Germany, ten miles north of Constance.

UBES, or *ST. UBES*, a city and port-town of Portugal, situated on a fine bay, twenty-one miles south of Lisbon.

UBIQUITARIANS, in church-history, a sect of heretics who sprung up in Germany about the year 1590, and maintained that the body of Jesus Christ is *ubique*, everywhere, or in every place, at the same time. However, they were not quite agreed among themselves; some holding, that the body of Jesus Christ, even during his mortal life, was every where; and others dating the ubiquity of his body from the time of his ascension only.

UBIQUITY, omnipresence; an attribute of the Deity, whereby he is always intimately present to all things; gives the esse to all things; knows, preserves, and does all in all things. See *GOD*.

For, since God cannot be said to exist in all places, as placed therein (because then he would need something to his existence, *viz.* place; and would have extension, parts, &c.) he must be conceived to be everywhere, or in all things, as a first, universal, efficient cause, in all his effects. See *CAUSE*, &c.

He is present therefore to all his creatures, as a pure act or an exercise of an active virtue, which knows, preserves, governs,

governs, &c. every thing. Nor are even finite minds present, otherwise than by operation.

JCKERMUND, a town of Upper Saxony, and dutchy of Pomerania, situated on a bay of the Baltic-Sea, twenty-five miles north-west of Stetin.

UDDER, *uber*, in comparative anatomy, that part in brutes wherein the milk is prepared, answering to the mammæ, or breasts, in women. See **BREASTS**.

UDENSKOI, a town of Siberia, situated in east long. 96° 30', north lat. 53°.

UDINA, a town of Friuli, in Italy, twenty-five miles north of Aquileia.

VECHT, a town of Westphalia, in Germany, thirty miles north of Osnabrug.

VECHT is also a river in the United Netherlands; which running from east to west through the province of Overysse, falls into the Zuyder-sea below Swartfluis.

VECTIS, the **LEVER**, one of the mechanic powers. See the article **LEVER**.

VECTOR, in astronomy, a line supposed to be drawn from any planet moving round a center, or the focus of an ellipsis, to that center or focus.

This, by some writers of the new astronomy, is called vector, or radius vector, because it is that line by which the planet seems to be carried round its center, and with which it describes areas proportional to the times. See the articles **PLANET**, **AREA**, &c.

VEDETTE, in the military art, a sentinel on horseback detached from the main body of the army, to discover and give notice of the enemies designs.

VEER, a sea-term variously used. Thus veering out a rope, denotes the letting it go by hand; or letting it run out of itself. It is not used for letting out any running rope except the sheet.

VEER is also used in reference to the wind; for, when it changes often, they say it veers about.

VEGETABLE, *vegetabile*, in physiology, a term applied to all plants, considered as capable of growth; *i. e.* all natural bodies which have parts organically formed for generation and accretion, but not sensation. See the article **PLANT**.

Vegetables, according to the analyses made of them by chemistry, are distinguishable into two grand tribes, the acid and the alkaline; the first affording a volatile acid, and the second a volatile alkali, upon a dry distillation: thus guaiacum, cedar, box, cinnamon, cloves, sorrel, mist, balm, &c. afford an acid; but

garlic, leeks, onions, horse-radish, scurvy-grass, mustard, &c. afford an alkali, which, when rectified, is hardly distinguishable from that of animal substances, so as nearly to resemble the spirit and salt of hartshorn.

VEGETATION, in physiology, the act whereby plants receive nourishment and grow. See the article **PLANT**.

The process of nature, in the vegetation of plants, is very accurately delivered by the excellent Malpighi, to the effect following: The egg, or seed, of the plant being excluded out of the ovary, called pod, or husk, and requiring further fostering and brooding, is committed to the earth; which having received it into her fertile bosom, not only does the office of incubation, by her own warm vapours and exhalation, joined with the heat of the sun; but, by degrees, supplies what the seed requires for its further growth: as abounding everywhere with canals and sinuses, wherein the dew and rain-water, impregnated with fertile salts, glide, like the chyle and blood in the arteries, &c. of animals. This moisture, meeting with a new deposited seed, is percolated, or strained through the pores or pipes of the outer rind, or husk, corresponding to the secundines of the fœtus, on the inside whereof lies one or more, commonly two, thick feminal leaves, answering to the placenta in women, and the cotyledons in brutes. See the articles **EGG**, **SEED**, &c.

These seed-leaves consist of a great number of little vesiculæ, or bladders, with a tube corresponding to the navel-string in animals. In these vesiculæ is received the moisture of the earth, strained thro' the rind of the seed; which makes a slight fermentation with the proper juice before contained therein. This fermented liquor is conveyed by the umbilical vessel to the trunk of the little plant; and to the gem, or bud, which is contiguous thereto: upon which a vegetation and increase of the parts succeed.

Such is the procedure in the vegetation of plants; which the illustrious author exemplifies in a grain of wheat, as follows: The first day the grain is sown it grows a little turgid; and the secundine, or husk, gapes a little in several places; and the body of the plant, being continued by the umbilical vessel to a conglobated leaf (which is called the pulp or flesh of the seed, and is what constitutes the flower) swells; by which means, not only

only the gem or sprout (which is to be the future stem) opens, and waxes green, but the roots begin to bunch out; whence the placenta, or seed-leaf, becoming loose, gapes. The second day, the secundine, or husk, being broke through, the stem, or top of the future straw, appears on the outside thereof, and grows upwards by degrees: in the mean time, the seed-leaf, guarding the roots, becomes turgid with its vesiculae, and puts forth a white down. And the leaf being pulled away, you see the roots of the plant bare; the future buds, leaves, and rest of the stalk lying hid. Between the roots and the ascending stem the trunk of the plant is knit, by the navel-knot, to the flower-leaf, which is very moist, though it still retains its white colour and its natural taste. The third day, the pulp of the conglobated, or round leaf, becomes turgid with the juice which it received from the earth fermenting with its own.

Thus the plant increasing in bigness, and its bud or stem becoming taller, from whitish turns greenish: the lateral roots also break forth greenish and pyramidal from the gaping sheath, which adheres chiefly to the plant; and the lower root grows longer and hairy, with many fibres shooting out of the same.

Indeed there are hairy fibres hanging all along on all the roots, except on their tips; and these fibres are seen to wind about the saline particles of the soil, little lumps of earth, &c. like ivy; whence they grow curled. Above the lateral roots there now break out two other little ones.

The fourth day, the stem, mounting upwards, makes a right angle with the seminal leaf: the last roots put forth more; and the other three, growing larger, are clothed with more hairs, which straitly embrace the lumps of earth; and where they meet with any vacuity, unite into a kind of net-work.

From this time forward the root pushes with more regularity downward, and the stalk upward, than before. There is, however, this great difference in their growth, that the stalk and branches find no resistance to their shooting up, while the roots find a great deal to their shooting downward, by means of the solidity of the earth, whence the branches advance much faster and farther in their growth than the roots; and these last, often finding the resistance of

a tough earth unsurmountable, turn their course, and shoot almost horizontally. See the article GENERATION.

VEGETATIVE SOUL, among philosophers, denotes that principle in plants, by virtue of which they vegetate, or receive nourishment and grow. See the preceding article.

VEHICLE, *vehiculum*, in general, denotes any thing that carries or bears another along; but is more particularly used in pharmacy for any liquid serving to dilute some medicine, in order that it may be administered more commodiously to the patient.

VEIL, *velum*, a piece of stuff, serving to cover or hide any thing.

In the romish churches, in time of Lent they have veils or curtains over the altar crucifix, images of saints, &c.

A veil or crape is wore on the head by nuns, as a badge of their profession: the novices wear white veils; but those who have made the vows, black ones. See the article NUN.

VEIN, *vena*, in anatomy, is a vessel which carries the blood from the several parts of the body to the heart. The veins are composed principally of a membranaceous, a vasculous, and a muscular tunic: but these are vastly thinner than in the arteries. See ARTERY.

The veins are only a continuation of the extreme capillary arteries, reflected back again towards the heart, and uniting the channels as they approach it, till at last they all form three large and primary veins, *viz.* the cava, which brings the blood back from all parts above and below the heart; the vena portae, which brings the blood from the liver; and the pulmonary vein. See CAVA, &c.

The best method of tracing the general course of the veins, is to begin with the main trunks, or primary veins, and end with their ramifications and capillary extremities, according to their several divisions and subdivisions.

The vena cava arises, with a large sinus from the right auricle of the heart; see plate CCXCIII. fig. 1. and 2. where it is marked 1: and here it lends out a vein to the heart itself, called the coronary vein; and is divided into two trunks, a superior, called the cava ascendens, marked 2; and an inferior one, called the cava descendens, and marked 3. From the superior trunk of the vena cava, arise the following veins, *viz.* the vena azgos, marked 4; the bronchial vein, which

Fig. 1.

The VEINS of the Human Body.





in some subjects, indeed, does not rise separate, but comes from the azygos, and sometimes from the intercostals, and in some is altogether wanting; the mediastinal vein, which accompanies the mediastinal artery; the superior diaphragmatic, which in like manner accompanies the artery of that name; and finally, the subclavians, marked 5, 5. From these last arise, on each side, the external jugular vein, marked 6, 6, where the right one, in fig. 1. is cut off: the jugular vein in its sub divisions receives different denominations from the parts over which they are distributed; as the frontal, temporal, occipital, &c. From the subclavians likewise arise the internal jugulars, marked 7, 7: these give ramifications to the larynx, pharynx, the muscles of the os hyoides, and to the tongue: and besides these, its trunk terminates in a sack, and brings back the blood from the brain and sinuses of the dura mater. From the same veins likewise arise the vertebral one, which ascends to the cranium thro' the transverse apophyses of the vertebræ of the neck; also the intercostals, marked 8 (fig. 2.) the mammary veins, marked 9, 9, *ibid.* the scapulares and musculares: and, finally, the axillary veins, marked 10, 10, the exterior branch of which is called the cephalic, marked 11, 11, (fig. 1. and 2.) and extended along the exterior part of the arm towards the thumb; its interior branch, called the basilic, and marked 12, 12; the vena mediana, formed of the concurrence of the hepatic and basilic, and marked 13, 13; and finally, that which runs over the back of the hand towards the little finger, is called the salvetella. See *Azygos*, &c.

The inferior trunk of the vena cava is remarkable for its valves, which serve to prevent the blood from returning towards the extremities: it is marked 3.

From it arise the following veins; *viz.* the diaphragmatic, hepatic, and renal or emulgent veins, which last go to the kidneys, and are marked 14, 14; also the spermatic veins, sacra and iliacs, which last are marked 15, 15; and from these, on each side, arise hypogastrics and epigastrics, as also the crural veins, which go to the feet, and are marked 16, 16; the internal branch of this, toward the internal malleolus, is called the saphœna; and its external branch about the knee, the poplitea; in the leg it is called suralis; and about the great toe of each foot,

the cephalic vein of the foot. See the article *DIAPHRAGMATIC*, &c.

The vena portæ has some kind of resemblance to a tree in its structure: its roots, or inferior branches, being divided into the right and left. From the right arise all the meseraic veins of the intestines, the internal hæmorrhoidal, and the right epiploics: the left is called the splenic vein; from which arise the gastrics, the vasa brevia, the pancreatic epiploic, and sometimes also the internal hæmorrhoidal vein. The trunk of the vena portæ affords the cystic veins, the right gastric, duodenal, &c. And lastly, where the trunk begins to explicate, it constitutes the sinus portæ in the liver; and from this it is divided into innumerable branches, dispersed through the whole substance of the liver. See the articles *LIVER*, *MESERAIC*, &c.

The third primary vein is the pulmonary one, which arises from the left auricle of the heart, where it first forms a sinus; and is, soon afterwards, divided into four branches, and finally into innumerable ramifications, distributed through the whole substance of the lungs (*ib.* fig. 3.) represents the pulmonary vein in the time of expiration; *a* being its trunk, cut close to the base of the heart; *b, b*, its divisions to the right and left lobe of the lungs; *c* the canalis arteriosus; *d, d*, the extremities of the arteries freed from the vesicles of the lungs, and their inosculations with the pulmonary veins.

VEIN, among miners, is that space which is bounded with woughs, and contains ore, spar, canck, clay, chirt, croil, brownhen, pitcher-chirt, cur, which the philosophers call the mother of metals, and sometimes soil of all colours. When it bears ore, it is called a quick vein; when no ore, a dead vein. See *TRACING*.

VEJOURS, *visiores*, in law, are those sent by the court, to take a view of any place in question for the better decision of the right.

It is also used for those who are sent to view such as effoign themselves de malo lesli, whether in truth they be such as that they cannot appear, or whether they be counterfeit. See *ESSOIN*.

VEIT, or *St. VEIT*, the name of two towns in the circle of Austria, in Germany; one in the dutchy of Carniola, and the other in that of Carinthia.

VELA, a remarkable cape on the coast of Terra Firma, in west long. 73° 30', and north lat. 12°.

VELA.

VELAMENTUM BOMBYCINUM, a name which some anatomists give to the velvet membrane, or inner skin of the intestines. See **INTESTINES**.

VELARIUS, in antiquity, an officer in the court of the Roman emperors, being a kind of usher, whose post was behind the curtain in the prince's apartments; as that of the chancellors was at the entry of the balustrade, and that of the ostiarii at the door. The velarii had a superior of the same denomination who commanded them.

VELAY, the north-east division of Languedoc, in France.

VELITES, in the Roman army, a kind of antient soldiery, who were armed lightly with a javelin, a cask, cuirasse and shield.

VELLEITY, *velleitas*, in the school-philosophy, is usually defined a languid, cold, and remiss will. Others say, it implies an impotency of obtaining what we require. Others will have it a slight desire for something which a person does not matter much, or is too indolent to seek. See the article **WILL**, &c.

VELDENTS, a town in the circle of the Lower Rhine, in Germany, situated on the east side of the river Moselle, fifteen miles east of Triers.

VELEZ, a town of New Castile, fifty miles south-east of Madrid.

VELIRA, a town of Sclavonia, sixty miles north-west of Posega: east long. $17^{\circ} 31'$, north lat. $46^{\circ} 15'$.

VELLA, in botany, a genus of the tetradynamia-filiculosa class of plants, with a tetrapetalous cruciform flower; the stamina are six filaments, about the length of the cup; and the fruit is a globose, cristate, bilocular pod, containing a few roundish seeds.

VELLETRI, a town of the Campania of Rome, about twenty miles east of that city.

VELLICATION, among physicians, the act of twitching. The word is more particularly applied to a sort of sudden convulsions that happen to the fibres of the muscles.

VELOCITY, swiftness, or that affection of motion whereby a moving body is disposed to run over a certain space in a certain time. See **MOTION**.

For the velocity of falling bodies, see the article **ACCELERATION**.

In the doctrine of fluxions it is usual to consider the velocity with which magnitudes flow, or are generated. Thus, the velocity with which a line flows, is

the same as that of the point, which is supposed to describe or generate the line. The velocity with which a surface flows is the same as the velocity of a given right line, that, by moving parallel to itself, is supposed to generate a rectangle, always equal to the surface. The velocity with which a solid flows, may be measured by the velocity of a given plain surface that, by moving parallel to itself, is supposed to generate an erect prism, or cylinder, always equal to the solid. The velocity with which an angle flows, measured by the velocity of a point, is supposed to describe the arc of a given circle, which subtends the angle, and measures it. All these velocities are measured at any term of the time of the motion, by the spaces which would be described in a given time, by the points, lines, or surfaces, with the motions continued uniformly from that term.

The velocity with which a quantity flows, at any term of the time, while it is supposed to be generated, is called **FLUXION**. See the article **FLUXION**.

VELOM, a kind of parchment, fine, even, and whiter than the common sort. See the article **PARCHMENT**.

VELVET, a rich kind of stuff, all fine, covered on the outside with a close, short, fine, soft shag, the other side being a very strong close tissue.

The nap or shag, called also the velvetting, of this stuff, is formed of part of the threads of the warp, which the workman puts on a long narrow-channelled rule or needle, which he afterwards cuts, drawing a sharp steel tool along the channel of the needle to the ends of the warp. The principal and best manufactories of velvet are in France and Italy, particularly in Venice, Milan, Florence, Genoa, and Lucca: there are others in Holland set up by the french refugees; where that at Harlem is the most considerable, but they all come short of the beauty, those in France, and, accordingly, are sold for 10 or 15 per cent. less. There are even some brought from China, but they are the worst of all.

There are velvets of various kinds, plain, that is, uniform and smooth, without either figures or stripes.

Figured velvet, that is, adorned or worked with divers figures, though the ground be the same with the figure, that is, the whole surface velvete.

Ramage or branched velvet, representi

long stalks, branches, &c. on a fatten ground, which is sometimes of the same colour with the velvet, but more usually of a different one. Sometimes, instead of fatten, they make the ground of gold and silver; whence the denominations of velvets with gold ground, &c.

Shorn velvet, is that wherein the threads, that make the velveting, have been ranged in the channeled ruler, but not cut there. Striped velvet, is that wherein there are stripes of divers colours running along the warp, whether these stripes be partly velvet, and partly fatten, or all velveted. Cut velvet, is that whereon the ground is a kind of taffety, or gros de tours, and the figures velvet.

Velvets are likewise distinguished, with regard to their different degrees of strength and goodness, into velvets of four threads, three threads, two threads, and a thread and a half: the first are those where there are eight threads of shag, or velveting, to each tooth of the reed; and the second have only six, and the rest four.

In general, all velvets, both worked and cut, shorn and flowered, are to have their warp and shag of organism, spun and twisted, or thrown in the mill; and their woof of silk well boiled, &c. They are all of the same breadth.

VENA, VEIN, in anatomy. See VEIN.

VENAFRO, a town of Italy, twenty-five miles north of Naples.

VENAÏSSIN, the territory whereof Avignon is the capital. See AVIGNON.

VENAL, or VENOUS, among anatomists, &c. something that bears a relation to the veins. See the article VEIN.

This word is also used for something bought with money, or procured by bribes.

VENANT, or St. VENANT, a town of Artois, twenty miles west of Lille.

VENCE, a town of Provence, in France, situated on the confines of Piedmont, ten miles west of Nice.

VENDEE, in law, signifies the person to whom a thing is sold; in opposition to vendor, or seller.

VENDITIONI EXPONAS, in law, a judicial writ directed to the sheriff, commanding him to sell goods, which he had formerly, by command, taken into his hands, for the satisfying a judgment given in the king's court.

VENDOSME, a town of Orleansois, in France, situated on the river Loire, thirty-seven miles west of Orleans.

VENEERING, VANEERING, or FINEER-

ING, a kind of marquetry, or inlaying, whereby several thin slices or leaves of fine woods, of different kinds, are applied and fastened on a ground of some common wood. See MARQUETRY.

There are two kinds of inlaying; the one, which is the most common and more ordinary, goes no farther than the making of compartments of different woods; the other requires much more art, in representing flowers, birds, and the like figures.

The first kind is properly called veneering; the latter is more properly called marquetry.

The wood used in veneering is first sawed out into slices or leaves about a line in thickness; *i. e.* the twelfth part of an inch. In order to saw them, the blocks or planks are placed upright, in a kind of sawing press. See SAWING MILL.

These slices are afterwards cut into narrow slips, and fashioned divers ways, according to the design proposed; when the joints having been exactly and nicely adjusted, and the pieces brought down to their proper thickness, with several planes for the purpose, they are glued down on a ground or block, with good strong english glue.

The pieces being thus jointed and glued, the work, if small, is put in a press; if large, 'tis laid on a bench covered with a board, and pressed down with poles or pieces of wood, one end of which reaches to the ceiling of the room, and the other bears on the board.

When the glue is thoroughly dry, it is taken out of the press and finished; first with little planes, then with divers scrapers, some of which resemble rasps, which take off the dents, &c. left by the planes.

After it has been sufficiently scraped, they polish it with the skin of a sea-dog, wax and a brush, or polisher of shave grass; which is the last operation.

VENEREAL, something belonging to venery; as the lues venerea, french disease, or pox. See POX, GONORRHOEA, &c.

VENERIS OESTRUM, the stimulus or incentive of venery, is an appellation given by some anatomists to the clitoris.

VENERIS OESTRUM is also used by others for the transport of love, or the utmost extacy of desire, or enjoyment, in coition.

VENERY, is used for the act of copulation, or coition, of the two sexes. See the article GENERATION.

VENERY

VENERY also denotes the act or exercise of hunting wild beasts, which are also called beasts of venery, and beasts of the forest. See the article **GAME**.

VENESECTIION, or **PHLEBOTOMY**, in surgery. See the article **PHLEBOTOMY**.

VENETA bolus, the *Venetian bole*, a fine red earth used in painting, and called in the colour-shops *venetian red*. It is improperly denominated a bole, being a genuine species of red ochre. It is of a fine bright, and not very deep red, approaching, in some degree, to the colour of minium, or red-lead, and is moderately heavy, and of an even and smooth texture, yet very friable, and of a dusty surface: it adheres firmly to the tongue, is very smooth, and soft to the touch, easily crumbles to pieces between the fingers, and very much stains the skin in handling. It has a slight astringent taste, and makes no fermentation with acids. It is dug in Carinthia, and sent from Venice to all parts of the world, being an excellent colour, and very cheap; our colour-men however find many ways of adulterating it.

VENEZUELA, a province of Terra Firma, lying on the northern ocean, and having new Andalusia on the east, new Granada on the south, and the river De la Hacha on the west.

VENIAL, in the Romish theology, a term applied to slight sins, and such as easily obtain pardon. In confessing to the priests, people are not obliged to accuse themselves of all their venial sins. The thing that gives the greatest embarrass to the Romish casuists, is to distinguish between venial and mortal sins. The reformed reject this distinction of venial and mortal sins, and maintain, that all sins, how grievous soever, are venial, and all sins, how slight soever, are mortal. And the reason they urge is, that all sins, though of their own nature mortal, yet become venial or pardonable, by virtue of our Saviour's passion, to all such as fulfil the conditions on which it is offered in the gospel.

VENICE, the capital of a republic in Italy, of the same name, is situated in the Lagoon, or small islands, of the gulph of Venice, about five miles from the continent: east longit. 13°, and north lat. 45° 40'.

Venice is so happily situated, that no army can approach it by land; the avenues to those islands being so exceeding difficult, that they have not thought it ne-

cessary to inclose the city with a wall. Nothing can appear more beautiful than this city, as we approach it either from the continent or the sea, with its numerous palaces and lofty towers: its circumference is about six miles, and its inhabitants are computed at two hundred thousand.

VENIRE FACIAS, in law, is a judicial writ lying where two parties plead and come to issue; directed to the sheriff, to cause twelve men, of the same neighbourhood, to meet, and try the same, and to say the truth upon the issue taken.

VENLO, a town of dutch Gelderland, situated on the river Maes, nine miles south of Gelder.

VENOSA, a town of Italy, eighty miles east of Naples.

VENT, **VENT-HOLE**, or **SPIRACLE**, a little aperture left in the tubes or pipes of fountains, to facilitate the air's escape; or, on occasion, to give them air, as in frosty weather, &c. for want of which they are apt to burst. See **PIPE**. Vent is likewise applied to the covers of wind-furnaces, whereby the air enters, which serves them for bellows, and which are stopped with registers or sluices, according to the degree of heat required, as in the furnaces of glass-houses, assayers, &c.

VENTA DE CRUZ, a town of Terra Firma, forty miles south of Porto Bello.

VENTER, **BELLY**, in anatomy, a cavity in the body of an animal, containing viscera, or other organs necessary for the performance of divers functions.

Physicians divide the human body into three venters, regions, or cavities; the first, the head, containing the brain, &c. See the article **SKULL**, &c.

The second, the breast, or thorax, as far as the diaphragm, containing the organs of respiration. See **THORAX**.

The third, which is what we call the venter, or belly, is that wherein the intestines and organs of generation and digestion are contained; called, by anatomists, the abdomen. See **ABDOMEN**.

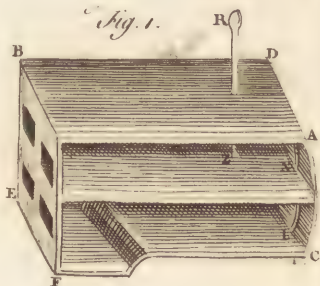
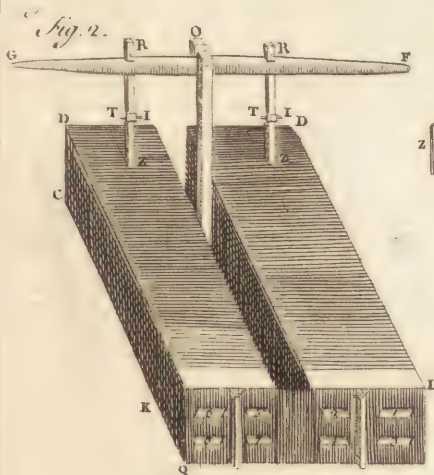
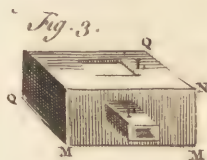
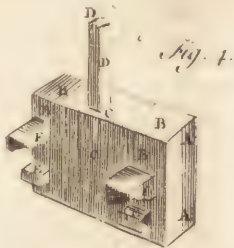
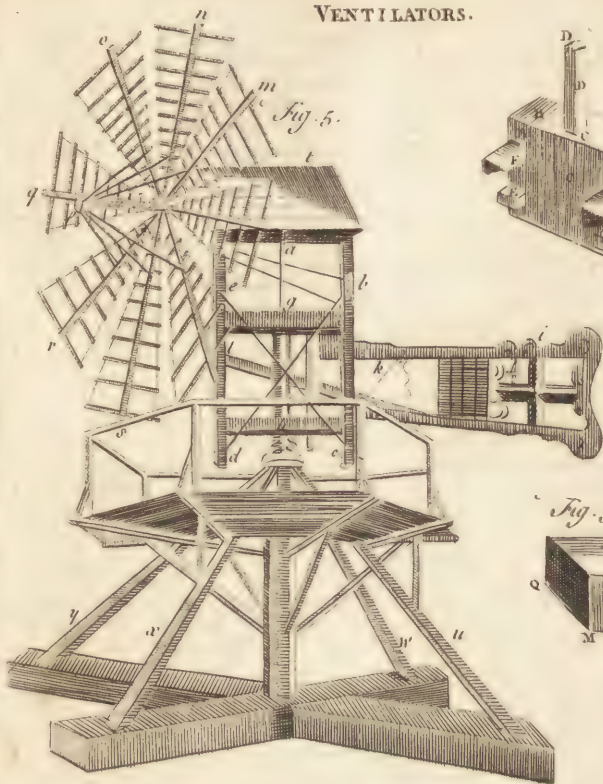
VENTER is also used in speaking of a partition of the effects of a father and mother, among children born, or accruing from different marriages.

VENTER is also used for the children whereof a woman is delivered at one pregnancy: thus, two twins are said to be of the same venter.

VENTER, or **BELLY** of a muscle, is the fleshy or belly-part thereof, as contradistin-



VENTILATORS.



distinguished from the two tendons, its extremes, one whereof is called the head, and the other the tail, of the muscle. See the article **MUSCLE**.

VENTER DRACONIS, **DRAGON'S BELLY**, in astronomy, denotes the middle of a planet's orbit, or that part most remote from the nodes, *i. e.* from the dragon's head and tail; being the part which has the greatest latitude, or is at the greatest distance from the ecliptic.

VENTIDUCTS, in building, are spiracles or subterraneous places, where fresh, cool wind being kept, they are made to communicate, by means of tubes, funnels, or vaults, with the chambers or other apartments of a house, to cool them in sultry weather.

VENTILATOR, a machine by which the noxious air of any close place, as an hospital, gaol, ship, chamber, &c. may be changed for fresh air. The noxious qualities of bad air have been long known, though not sufficiently attended to, in practice; but it is to be hoped, that the indefatigable pains taken by Dr. Hales, to set the mischiefs arising from foul air in a just light, and the remedy he has proposed by the use of his ventilators, will at length prevail over that unaccountable sloth or obstinacy, which, where particular interests are not concerned, seems to possess the generality of mankind, and which rarely allows them to give due attention to any new discovery. The ventilators invented by that ingenious gentleman, consist of a square box, **ABCD** (plate **CCXCIV**. fig. 1.) about ten feet long, five wide, and two deep; in the middle of which is placed a broad partition, or midriff, made to move up and down, from **A** to **C**, on hinges at the end **E**, by means of an iron-rod **ZR**, fixed to the midriff at **Z**. Another box, of the same size with the former, having a like midriff, bar, &c. is placed near the former, *ibid.* fig. 2. with its rod **RZ**. Both these rods are fixed to a lever **FG**, moveable on the center **O**; so that by the alternate rising and depressing of the lever **FG**, the midriffs are also raised and depressed alternately, by which means these double bellows are at the same time both drawing and pouring out the air. That the midriffs may be rendered lighter, they may be made of four bars lengthwise and as many placed cross them, each about three inches broad, and an inch thick, the vacant spaces being filled up with thin pannels of fir-board.

In order to make the midriffs move with greater ease, and without touching the sides of the boxes, there is an iron-regulator **NL**, fig. 1, fixed upright to the middle of the end **AC** of the box. As very little air will escape if the edges of the midriff be within one twentieth part of an inch from the sides of the box, there is no necessity for leathern sides, as in common bellows. The end **AC** of the box must be somewhat circular, that it may be the better adapted to the rising and falling of the midriff; and at the other end of the midriff a slip of leather may be nailed over the hinges.

To the ventilators above described, eight valves are adapted for the air to pass through; these valves are placed at the hinge-end **BQ**, fig. 2. numbered 1, 2, 3, 4, &c. The valve 1 opens inward, to admit the air to enter, when the midriff is depressed at the other end, by means of the lever **FG**; and at the same time the valve 3, in the lower ventilator, is shut by the compressed air, which passes out at the valve 4: but when that midriff is raised, the valve 1 shuts, and the air passes out at the valve 2. The same is to be observed of the valves 5, 6, 7, 8, of the other box; so that when by the motion of the lever **FG**, the midriffs are alternately rising and falling, then two of the ventilators are constantly drawing in the air, and two of them at the same time are blowing it out at their proper valves, the air entering at the valves 1, 3, 6, 8, and passing out at the valves 2, 4, 5, 7. To the ventilators, before the valves, is fixed a box **QQMM**, fig. 3. as a common receptacle for all the air that comes out of these valves, which air is conveyed away through the trunk **P**, passing through the wall of a building, &c.

From the foregoing explanation, the nature of ventilators may be easily understood, and therefore we shall be briefer in the following description of those lately erected in Newgate, for exhausting that prison of its foul air. In this prison then there are seven ventilators, each nine feet long, and four feet and a half wide; two pair of which are laid on each other: these ventilators are worked by means of a wind-mill. The valves of the ventilators open into a large wooden box **AB**, fig. 4. which is fastened to the ventilators by the hooks **AA**: this box is divided into three spaces; the middle, or largest, **CC**, receives all the foul air dis-

charged by the ventilators, whence it passes through a trunk DD, sixteen inches wide, through the leads into the open air. The outer spaces BBBB, receive the foul air through the trunks FF, from the several wards, from whence it is conveyed into the ventilators, through those valves which open inward, and then discharged by the other valves of the ventilators, into the middle partition of the box, and from thence conveyed, by the pipe DD, into the open air. These ventilators are fixed in an upper room of Newgate, in order to be near the leads, where the wind-mill, which works them, is erected; and from each of the outer nostrils FF, there are trunks, with sliding shutters, passing into the several wards; so that by opening these trunks, any of the wards may be ventilated, either singly, or several at a time. That the midribs may not be spoiled for want of air, when all the trunks are shut, there are two holes cut in the outer nostrils, at EE, which are covered with boxes twenty inches long, and fourteen wide. In the bottom of each of these boxes is a large moveable valve, of such a weight as not to open but when all the other passages for the air are stopped: by means of these valves the ventilators are supplied with air, when all the trunks, going into the several wards, are closed, and the midribs are not in danger of breaking for want of it.

The wind-mill, fig. 5. erected for working the ventilators, is designed to move with a small degree of wind, that the ventilators may be the oftener worked. The mill post is fixed on four cross-trees, and supported by the braces *uwx*. This post is hollow, that the iron-rod *a*, may pass through, the lower end of it being fixed to the lever of the ventilators. The upper end of this rod goes to the iron-axle-tree, which has a crank six inches long, and therefore gives a stroke of thirteen inches; and the other end being fixed to the lever, at a proper distance from the center of its motion, raises the midribs fifteen inches. The iron-axle-tree extends about two feet beyond the face of the sails, from the extremity of which, *p*, eight iron-braces go to the vanes *m, n, o, p, q, r, s, &c.* The frame turns on the post, on friction-wheels, so that the sails always face the wind, by means of the vane *i*; *l* is the break-pole, which, by pulling the rope *k*, stops the mill: *b, d, c, e*, are iron-

braces, fastened at each end with iron-bolts, to keep the frame from wracking. See the article WIND-MILL.

Fig. 6. represents an instrument invented for going with safety into damps, and other noxious air. XZ represents a square piece of elder, or willow, a foot long, and two inches both in breadth and depth, with a hole, K LQU, five eighths of an inch diameter, bored through it; and, at CD, short fossets, with like holes bored through them; to which fossets hollow reed-canes are to be fixed by means of short supple leathern pipes, so as to be flexible at these joints. N, T, S, are square holes, two inches deep, and an inch and three quarters wide, with their leathern covers FG, HI, nailed over them. IN is a broad leathern valve, moving on joints at I, so as to open, by the force of the air, which passes down the pipe BKL, when the breath is drawn in at the mouth at the middle fossset, which stands five eighths of an inch above GH. GS is another like valve, which shuts the hole, at Q, close, while the breath is drawing in, through the middle fossset; but when, on the contrary, the person breathes out through the middle fossset, the valve IN closes the hole L, and the other valve GS opens for the breath to pass freely off through the pipe UA; by which means the person always draws in fresh air. There are two stiff wires as T, fixed to prevent the valves opening too far, lest the force of the breath, which is but small, should not shut them. This instrument is to be fixed to the mouth by a tape, or cord, tied round the head; and it will be convenient to have cushions at the corners C and D, for the cheeks to bear off a part of the pressure. By the help of this instrument a person may go into a suffocating air, as in some mines, &c. his nostrils being stopped with cotton, without any danger of suffocation.

VENTIMIGLIA, a port-town of Italy, belonging to the Genoese, situated on the Mediterranean, 100 miles south-west of Genoa: east lon. $7^{\circ} 30'$, north lat. $43^{\circ} 45'$.

VENTRICLE, *ventriculus*, properly denotes any little cavity; but is more particularly used, by physicians and anatomists, for the stomach. See STOMACH.

For those cavities of the heart and brain, called ventricles, see HEART and BRAIN.

VENTRILOQUOUS, an appellation given to the engrammythi. See the article ENGRAMMYTHI.

VENTURINE, or ADVENTURINE, is some-

sometimes used for the finest and slenderest gold-wire used by embroiderers. See the article **WIRE**.

VENUS, in astronomy, one of the inferior planets, revolving round the sun, in an orbit between that of mercury and the earth. See **PLANET**, **ORBIT**, &c. According to Mr. Cassini, the greatest distance of venus from the earth is 38415, the mean distance 22000, and the least distance 5585, semi-diameters of the earth. Her distance from the sun is $\frac{723}{1600}$ of the earth's distance from the sun: her excentricity 5; the inclination of her orbit 3° 23'; and her parallax 3'. See the articles **DISTANCE**, **EXCENTRICITY**, **INCLINATION**, and **PARALLAX**. The semi-diameter of venus is to that of the earth as 10 to 19; her periodical course round the sun is performed in 224 days, 17 hours; and her motion round her own axis in 23 hours. See the articles **DIAMETER** and **PERIOD**.

Venus is easily distinguished by her brightness and whiteness, which exceeds that of all the other planets, and which is so considerable, that in a dusky place she projects a sensible shadow. See constantly attends the sun, and never departs from him above 47°. When she goes before the sun, that is, rises before him, she is called phosphorus, or lucifer, or the morning star; and when she follows him, that is, sets after him, heesperus, or vesper, or the evening star. See the articles **PHOSPHORUS**, **VESPER**, &c.

The eye in venus will behold four planets above it, *viz.* our earth, mars, jupiter, and saturn; and one below it, which is mercury: and when our earth is in opposition to the sun, it will appear then (in the night) to shine with a full orb, and be very bright. The moon will appear always to accompany the earth, and never to be seen from her above half a degree. Mercury will never appear to be above 38° distant from the sun.

October 14, 1666, N. S. Cassini observed several spots in the body of this planet, by whose motion he judged (though he was not certain) that she moved either by a circulation, or a kind of libration round her axis, in about 23 hours. See the article **LIBRATION**.

A. D. 1672, and 1686, the same astronomer, with a telescope of 34 feet, believes he saw a satellite moving round this planet, and distant from it about three fifths of venus's diameter. It had the same phases with venus, but was with-

out any well defined form, and its diameter scarce exceeded one fourth of that of venus.

Dr. Gregory thinks it more than probable, that this was a satellite; and supposes the reason why it is not usually seen, to be the unfitness of its surface to reflect the rays of the sun's light; as is the case of the spots in the moon, of which, if the whole disc of the moon were composed, he thinks that the planet could not be seen in venus.

Venus, when viewed through a telescope, is rarely seen to shine with a full face, but has phases just like those of the moon, being now gibbous, now horned, &c. and her illumined part constantly turned towards the sun, *i. e.* looks towards the east, when phosphorus, and towards the west, when heesperus. See **PHASES**.

M. De la Hire, in 1700, through a telescope of 16 feet, discovered mountains in venus, which he found to be larger than those in the moon. See **MOON**.

Sometimes she is seen in the disc of the sun, in form of a dark round spot. See the article **TRANSIT**.

The phenomena of venus evidently shew the falsity of the ptolemaic system, for that system supposes that venus's orb incloses the earth. See the article **COPERNICAN SYSTEM**.

VENUS, in chemistry, the same with copper. See the article **COPPER**.

VERA, a port-town of Spain, in the province of Granada, forty-four miles south-west of Carthagea.

VERA CRUZ, a port-town of Mexico, with a strong and commodious harbour, situated on the gulph of Mexico, in west long. 100°, north lat. 18° 30'.

VERA PAZ, or **COBAN**, the capital of a province of the same name, in Mexico: west long. 93°, and north lat. 15° 6'.

VERAGUA, a province of Mexico, situated on the South sea, westward of the gulph of Panama.

VERATRUM, the **WHITE HELLEBORE**, in botany, a genus of the polygamia-monœcia class of plants, the hermaphrodite corolla whereof consists of six oblong, lanceolated, serrated petals; the male corolla is divided into six parts; the fruit consists of three oblong, erect, compressed capsules, made up of one valve, and containing only one cell; the seeds are numerous, compressed, and truncated, and more obtuse upon one extremity. For the virtues of this plant, see the article *White HELLEBORE*.

VERB,

VERB, in grammar, a word serving to express what we affirm of any subject, or attribute to it; or, according to others, it is a word principally used to signify the affirmation, and shews that the discourse, wherein it is used, is that of a man, who not only has a conception of things, but judges or affirms something of them: though it is principally used in this sense, yet it is made use of also to signify other motions of the soul, as to desire, to pray, to command; but this it only does by changing the mood or inflexion. The verb, in its primary signification, should have no other use, but to mark the connexion which we make in the mind, between the two terms of a proposition: but the *esse*, *to be*, is the only one that has retained this simplicity; nor, in strictness, has this retained it, but in the third person, as *est*, *is*. Men being naturally inclined to shorten their expressions, to the affirmation they have almost always added other significations, in the same word, so as that two words make a proposition; as in *Petrus vivit*, *Peter lives*; where *vivit* includes both the attribute and affirmation; it being the same thing to say, *Peter lives*, as that *Peter is living*; and hence the great variety of verbs in every language. To consider simply what is essential to a verb, the only true definition is, a word signifying an affirmation; but if we should chuse to add its principal accidents, it may be defined thus; a word which signifies affirmation, with the designation of person, number, and time. Verbs are variously divided: with respect to the subject, they are divided into active, passive, neuter, &c. with respect to their inflexions, into regular, irregular, personal, impersonal, auxiliary, substantive, &c. A verb active is a verb which expresses an action that falls on another subject or object; such are *I love*, *I work*, &c. which signify the action of loving, working, &c. of these there are three kinds; the one called transitive, where the action passes to a subject different from the agent; reflected, where the action returns upon the agent; and reciprocal, where the action returns mutually upon the two agents that produced it. A verb passive is that which expresses a passion, or which receives the action of some agent; and which is conjugated in the modern tongues, with the auxiliary verb *I am*, *je suis*. A verb neuter, is that which signifies an action that has no particular object whereon to fall, but

which of itself takes up the whole idea of the action, as *I sleep*, *thou yawnest*, *he snores*, *we walk*, *you run*, *they stand*: the Latins called them neuters, because they are neither active, nor passive, though they have the force and signification of both. Of these verbs some form their tenses by the auxiliary verb *to have*, as *I have slept*, *you have run*; and they are called neuter actives. There are others which form their compound parts by the auxiliary *to be*, as *I am come*; these are called neuters passive. A verb substantive is that which expresses the being or existence of a thing, as *I am*, *thou art*. Auxiliary or helping verbs, are those which serve in conjugating active and passive verbs, such are *I am*, *I have*, &c. Verbs in english, and most modern tongues, do not change their terminations, as in latin, to express the several times, modes, &c. but they make use of auxiliaries, as *have*, *am*, *be*, *do*, *will*, *shall*, &c. Regular verbs are those which are conjugated after some one manner, rule, or analogy. Irregular or anomalous verbs, are such as have something singular in the terminations or formations of their tenses. Verbs impersonal are those which have only the third person, as *it behoves*, &c. See IMPERSONAL, &c.

VERBAL, something that belongs to verbs, or even to words of any kind spoken with the mouth. See VERB and WORD.

Thus, verbal nouns, among grammarians, are those formed of verbs. See NOUN. Again, a verbal contract is one made merely by word of mouth in opposition to that made in writing. See the articles CONTRACT and DEED.

VERBASCUM, MULLEIN, in botany, a genus of the pentandria-monogynia class of plants, the flower of which is monopetalous, with a short cylindraceous tube, and a quinquepartite and rotated limb; the fruit is a roundish and bilocular capsule, containing numerous angulated seeds.

Mullein-leaves are recommended as emollient, and esteemed, by the Italians, in consumptions: its flowers have an agreeable honey-like sweetness; and an extract prepared from them, by rectified spirit of wine, tastes extremely pleasant.

VERBENA, VERVAIN, in botany, a genus of the diandria-monoecia class of plants, with a monopetalous flower, semiquinquefid at the limb; the seeds are two or four, and contained in the cup.

Vervain is quite disregarded in the present

sent practice, as appearing almost simply herbaceous.

VERBERATION, *smiting*, in physics, a term used to express the cause of sound, which arises from a verberation of the air, when struck in divers manners by the several parts of the sonorous body first put into a vibratory motion.

VERBESINA, in botany, a genus of the syngenesia-polygamia superflua class of plants, with a radiated flower, made up of hermaphrodite tubulose ones on the disc, and a few ligulated ones on the verge; the seeds are angulated, and contained in the cup.

VERCELLI, a city of Piedmont, in Italy, forty-five miles north-east of Turin.

VERD, or **CAPE-VERD**, a promontory of Africa, forty miles north-west of the mouth of the river Gambia: west long. 18°, north lat. 15°.

There are a number of islands in the Atlantic ocean, called Cape-Verd-islands, from their being situated off this cape.

VERDEGREASE, or **VERDEGRIS**, a kind of rust of copper, much used by painters as a green colour.

Verdegreafe is properly no other than copper, dissolved by a mild acid into the form of an ærugo, or rust. After pressing the grapes for wine, the husks, stones, and other refuse are laid to be dried in the sun; they are then moistened with the strongest wine that can be had, and laid together in vessels till they begin to ferment; after nine or ten days the matter is pressed, and worked into balls between the hands, and laid in an orderly manner over the bottom of an earthen vessel, and as much wine is laid over them as will cover them half way up. The vessels are then covered with a loose lid, and set in a cellar where the balls are left in the wine about fifteen hours, a person turning them four or five times in that space, in order to make the wine soak perfectly through them; after this, some wooden bars are placed across the vessel, about half an inch above the surface of the wine, and the balls are laid out of the wine upon these; the vessels are then shut up, and the whole left in this state for ten days or more: at the end of this time the balls emit a very penetrating scent, and are fit for dissolving copper. They are now to be broke to pieces, and the outside mixed with the internal part, which is moister; they are then laid with thin plates of copper, stratum super stratum, in the same vessels

upon the bars, and the whole is left for a week or a fortnight, at the end of which time the plates are found covered with verdegreafe, which is not taken off immediately: but they are wrapped up in cloths wetted with wine, and laid by a week or more, and then the ærugo or verdegreafe is taken off for use.

This rust of copper is rarely used internally, nor ought it, unless in the most desperate cases, where an instantaneous vomiting is necessary. Externally it is much used as a detergent or desiccative: it eats off fungous flesh in ulcers, and, mixed with honey, is used in aphthæ and ulcerations of the mouth. It is the basis of what is called the egyptian ointment, and of many other compositions in the same intention. There is a preparation of this ærugo of copper, in some use at present both in medicine and in painting, which ought not to be omitted here: it is called, though very imperfectly, distilled verdegreafe; it is a crystallization of verdegreafe, prepared thus: bruise to a coarse powder some fine green verdegreafe, pour on it distilled vinegar; to the remainder continue to do this, till the liquor will no longer extract any colour from the mass. Evaporate or distil these liquors, all mixed together, till a pellicle covers the surface, then set it in a cellar, and it will shoot into fine green crystals. Evaporate the remainder of the liquor, and set it to shoot again till no more will be produced. These are the crystals of verdegreafe, improperly called distilled verdegreafe. They are better than the crude substance, for eating away proud flesh. A solution of them in common water is an excellent detergent for old ulcers; and they are used in common eye-waters, to clear away specks and films. These crystals, distilled in a retort, afford, after an useless phlegm is come over, a noble acid, the richest that can be procured from vinegar. It is, by the chemical writers, called acetum esuriens; it is greatly celebrated for its virtues as a menstruum, and worthy great praise, tho' not equal to all that is said of it.

VERDERER, or **VERDEROR**, a judicial officer of the king's forest, whose business it is to look to the vert, and see it well maintained. See the article **VERT**.

VERDICT, is the answer of the jury given to the court, concerning the matter of

fact, in any case civil or criminal, committed by the court to their trial and examination. See the article **JURY**.

A verdict is either general or special. A general verdict is that which is brought into the court in like general terms as the general issue, as, in an action of disseisin, the defendant pleads no wrong, no disseisin. Then the issue is general, whether the fact be wrong or not, which being committed to the jury, they, upon consideration of the evidence, come in and say, either for the plaintiff, that it is a wrong disseisin; or for the defendant, that it is no wrong disseisin.

A special verdict, is, when they say at large, that such and such a thing they found to be done by the defendant or tenant; declaring the course of the fact, as in their opinion it is proved; and praying the judgment of the court, as to what is law in that case.

It is said, that a jury may give a general or special verdict, in all actions, and cases; and that the court is obliged to receive it, provided it be pertinent to the point in issue: also if the jury will take upon them to bring in any thing that is matter of law, their verdict shall be received.

Verdicts are also public and private; public, when the same are given in open court; and private, when given out of court, before any of the judges: but a private verdict, in strictness, is looked upon to be no verdict.

VERDITER, or **VERDETER**, a kind of mineral substance, sometimes used by the painters, &c. for a blue; but more usually mixed with a yellow for a green colour.

Verditer, according to Savary, ought to be made of the lapis armenus; or at least of an earthy substance much like it, brought from the mountains of Hungary, &c. only prepared by powdering it, and cleansing it by lotion,

But this stone being very rare, the verditer commonly used is not a native, but a factitious, substance; which some say is prepared by casting wine or water upon new copper, as it comes red hot out of the furnace, and catching the steams that rise from it upon copper-plates: others again say, it is prepared by dissolving copper-plates in wine, much after the manner of verdegrease.

But the method of making it in England is as follows:

The refiners pour their copper-water into

an hundred pound weight of whiting, stirring them well together every day for some hours, till the water grows pale; then they pour that off, and set it by for further use, and pour on more of the green water, repeating this till the verditer is made; which they then take out, and lay on large pieces of chalk in the sun to dry.

The water which is poured off from the verditer, (which remains at the bottom of the tub) is put into a copper, and boiled till it comes to the consistence of water-gruel; now, consisting principally of salt-petre reduced, most of the spirit of vitriol being gone with the copper into the verditer; and a dish full of this being put into the other materials for aquafortis, is re-distilled, and makes what they call a double water, which is near twice as good as that made without it.

VERDOY, in heraldry, denotes a bordure of a coat of arms, charged with any kinds or parts of flowers, fruits, seeds, plants, &c.

VERDUN, a city of Lorrain, situated on the river Maes, forty miles north-west of Nancy.

VERGE, signifies the compass of the king's court, which bounds the jurisdiction of the lord steward of the household; and which is thought to have been twelve miles round.

The term verge is also used for a stick or rod, whereby one is admitted tenant to a copyhold estate, by holding it in his hand, and swearing fealty to the lord of the manor.

VERGERS, certain officers of the courts of king's bench and common-pleas, whose business it is to carry white wands before the judges.

There are also vergers of cathedrals and collegiate churches, who carry a rod tipped with silver before the bishop, dean, &c.

VERGETTE, in heraldry, denotes a pallet, or small pale; and hence, a shield divided by such pallets, is termed vergette. See the article **PALE**.

VERGILÆ, in astronomy, a constellation, the appearance of which denotes the approach of spring: it is the same with pleiades. See **PLEIADES**.

VERIFICATION, in general, is the act of proving a thing; but among the french, it only signifies the recording of the king's edicts by the parliament.

VERJUICE, a liquor obtained from grapes or apples, unfit for wine or cyder; or from

from sweet ones, whilst yet acid and unripe. Its chief use is in sauces, ragouts, &c. though it is also an ingredient in some medicinal compositions, and is used by the wax-chandlers to purify their wax.

VERMICELLI, or **VERMICHELLY**, a composition of flour, cheese, yolks of eggs, sugar, and saffron, reduced to a paste, and formed into long slender pieces like worms, by forcing it with a piston thro' a number of little holes.

It was first brought from Italy, where it is in great vogue: it is chiefly used in soups and pottages, to provoke venery, &c.

VERMICULAR, an epithet given to any thing that bears a relation or resemblance to worms, *vermiculi*. See **WORM**.

Anatomists particularly apply it to the motion of the intestines and certain muscles of the body.

The vermicular or peristaltic motion of the intestines is performed by the contraction of the fibres thereof, from above downwards; as the antiperistaltic motion is by their contraction from below upwards.

VERMIFORMIS, in anatomy, a term applied to various parts in the human body, bearing some resemblance to worms. As some muscles, processes, &c.

Processus, or *apophyses* **VERMIFORMES**, two extremities of the cerebellum, situate near the fourth ventricle of the brain. See the article **BRAIN**.

VERMIFORMES musculi, are the four muscles in each hand and foot, which bring the fingers and toes towards the thumbs and great toes, called also *lumbricales*. See the article **LUMBRICAL**.

VERMILION, a very bright and beautiful red colour, in great esteem among the antients, under the name of *minium*. There are two kinds of it, the one natural, the other factitious. The natural is found in some silver mines, in the form of a ruddy sand, which is afterwards prepared and purified by several lotions and coctions. The artificial is made of mineral cinnabar, ground up with aqua-vitæ and urine, and afterwards dried.

It is also made of lead burnt and washed, or of cerus prepared by fire: but this is not properly called vermilion, but *minium*, or red-lead. See **MINIUM**.

Yet this last, however, seems to be the real vermilion of the antients; and both apothecaries and painters still give it the name, to enhance the price.

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We have two kinds of vermilion from Holland, the one of a deep red, the other pale; but it is the same thing at the bottom: the only difference of colour proceeding from the cinnabar's being more or less ground: when the cinnabar is finely ground, the vermilion is pale: and this is preferred before that which is coarser and redder.

It is of very great use with painters in oil and miniature; and among the ladies for a focus, or paint, to brighten the complexion of such as are too pale.

Some disapprove of vermilion to be used in painting prints, unless it be prepared by washing, as is directed for minium; and then chiefly for dry painting, except it be by those persons who can use it moderately, and with judgment; for all heavy colours will drown the shades or strokes of the engraver.

VERMIN, *vermina*, a collective name including all kinds of little animals, or insects, which are hurtful or troublesome to men, beasts, fruits, &c. as worms, lice, fleas, caterpillars, ants, flies, &c. See the article **WORM**, &c.

VERMINATION, *verminatio*, the act of breeding worms, and other vermin; particularly bots, in cattle, &c.

VERMINATION, is sometimes also used, among physicians, for a sort of tormina ventris, or wringing of the guts, wherein the patient is affected, as if worms were gnawing his intestines. See **GRIPES**.

VERMIVOROUS ANIMALS, are such as feed upon worms. See **ANIMAL**.

VERNACULAR, is applied to any thing that is peculiar to some one country.

VERNAL, something belonging to the spring season. See the article **SPRING**.

Hence vernal leaves, are those leaves of plants which come up in the spring. Vernal signs, are those which the sun is in during the spring season, *viz.* aries, taurus, and gemini. Vernal equinox, is that which happens when the sun is ascending from the equator towards the north pole. See the article **LEAF**, &c.

VERNEVIL, a town of Normandy, forty-three miles south of Rouen.

VERNIER, or **NONIUS**, among mathematicians, a scale of divisions, serving to cut the divisions of an arch into single minutes.

VERONA, a city of Italy; in the territories of Venice, capital of the Veronese, situated on the river Adige: east long.

11° 15', north lat. 45° 20'.

VERONICA, in botany, a genus of the

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decandria-

decandria-monogynia class of plants, the corolla whereof consists of a single petal; the tube is nearly of the length of the cup; the limb is plain, and divided into four parts; the segments are oval, and the lower one is narrower than any of the rest; the segment over-against it, is broader than any; the fruit is a capsule of a turbinated cordated figure, with a compressed apex, it is composed of four valves, and contains two cells, in each whereof are numerous roundish seeds.

Among the species of this genus, are the common speedwell, the brooklime, and the wild germander. See the article SPEEDWELL, &c.

These and several other species of this genus, are famous in medicine; the common speedwell is a good antiscorbutic, and has lately been celebrated in the gout and rheumatism. The water-brooklime is also one of the antiscorbutics of the shops, and its juice is also made a part of the spring juices given against those complaints.

VERSAILLES, a town of France, in the province of the isle of France, situated eleven miles west of Paris, where stands one of the most elegant and magnificent palaces in the world, built by Lewis XIV.

VERSE, *versus*, in poetry, a line or part of a discourse, consisting of a number of long and short syllables, which run with an agreeable cadence, the like being also reiterated in the course of the piece. See the article POEM.

This repetition, according to F. Bossu, is necessary to distinguish the notion of verse from that of prose; for in prose, as well as verse, each period and member are parts of discourse, consisting of a certain number of long and short syllables; only prose is continually diversifying its measures and cadences, and verse regularly repeating them. This repetition of the poets appears even in the manner of writing; for one verse being finished, they return to the beginning of another line, to write the verse following, and it is to this return, that verse owes its name. See the article PROSE.

To make verse, it is not enough that the measures and quantities of syllables be observed, and six just feet put one after another in the same line. There are further required, certain agreeable cadences, particular tenses, moods, regimens, and even sometimes words unknown in prose. But what is chiefly required, is an elevated, bold, figurative

manner of diction; this manner is a thing so peculiar to this kind of writing, that without it, the most exact arrangements of longs and shorts does not constitute verse so much as a sort of measured prose. The greek and latin verses consist of a certain number of feet, disposed in a certain order; and some have attempted to make french and english verses on the same foundation, but without success. Vossius is very severe on the modern verse, and makes it altogether unfit for music. Our verses, says he, run all as it were upon one foot, without distinction of members or parts, and without regard to the natural quantities of syllables. We have no rhythmus at all, and we mind nothing but to have a certain number of syllables in a verse of of whatever nature, and in whatever order. Mr. Malcolm vindicates our verse from this imputation. It is true, says he, we do not follow the metrical composition of the antients, yet we have such a mixture of strong and soft, long and short, syllables, as make our verses flow smooth or rumbling, slow or rapid, agreeable to the subject. Instances of all which we have in the following lines of Pope.

These equal syllables alone require,
Tho' oft the ear the open vowels tire,
While expletives their feeble aid do join,
And ten low words oft creep in one dull line.

Soft is the strain when Zephyr gently blows,

And the smooth stream in smoother numbers flows;

But when loud billows lash the sounding shore,

The hoarse rough verse should like the torrent roar;

When Ajax strives some rock's vast weight to throw,

The line too labours, and the words move slow.

Not so when swift Camilla scours the plain,

Flies o'er th' unbending corn, and skims along the main.

By making a small change or transposition of a word in any of these verses, any body who has an ear will find, that we make a great matter of the nature and order of the syllables. See NUMBERS.

Vossius adds, that the antient odes were sung as to the rhythmus, in the same manner as we scan them, every pes being a distinct bar, or measure separated by

by a distinct pause, though in reading, that distinction was not accurately observed. Lastly, he observes, that their verses had a regular return of the same kind of verse, and the same quantity of syllables, in the same place of every verse; whereas, in the modern odes, to follow the natural quantity of our syllables, every stanza would be a distinct song. See the article ODE.

Verses are of various kinds, some denominated from the number of feet, whereof they are composed, as the monometer, dimeter, trimeter, tetrameter, pentameter, hexameter, &c. See the articles HEXAMETER, &c.

Some also, from the kinds of feet used in them, as the pyrrhichion, proceleusmatic, iambic, trochaic, &c. See the article PYRRHICHION, &c.

Sometimes verses are denominated from the names of the inventors, or the authors who have used them with most success, as the anacreontic, archilochian, asclepiæ, alcaic, sapphic, &c. See the article ANACREONTIC, &c.

The moderns have invented heroic or alexandrine verses; the antients likewise invented various kinds of poetical devices in verse, as centos, echos, &c. See the article ALEXANDRINE, &c.

VERSE is also used for a part of a chapter, section, or paragraph, subdivided into several little articles. The whole bible is divided into chapters, and the chapters are subdivided into verses. The division of verses in the New Testament was first made by one Robert Stephens, with which division many learned men find great fault, and yet it is every where followed.

VERSED *sine of an arch*, a segment of the diameter of a circle, lying between the foot of a right line, and the lower extremity of the arch. See SINE.

VERSIFICATION, the art or manner of making verse; also the tune and cadence of verse. See the article VERSE.

Verseification is properly applied to what the poet does more by labour, art and rule, than by invention, and the genius or furor poeticus. See POETRY, &c.

VERSION, a translation of some book or writing, out of one language into another.

VERT, in heraldry, the term for a green colour. It is called vert in the blazon of the coats of all under the degree of nobles; but in coats of nobility, it is called emerald; and in those of kings,

venus. In engraving, it is expressed by diagonals, or lines drawn athwart from right to left, from the dexter chief corner to the sinister base, as represented in plate CCXC. fig. 4.

VERT, or GREEN HUE, in forest law, any thing that grows and bears a green leaf within the forest, that may cover a deer. This is divided into over-vert and nether-vert; over-vert is the great woods which in law-books are usually called hault-bois; neither-vert is the under woods, otherwise called sub-bois. We sometimes also meet with special vert, which denotes all trees growing in the king's woods within the forest; and those which grow in other men's woods, if they be such trees as bear fruit to feed the deer.

VERTEBRÆ, in anatomy, the twenty-four bones of which the spine consists, and on which the several motions of the trunk of our bodies are performed. See the article SPINE.

Each of these vertebræ is composed of its body and processes. The body is the thick, spongy, anterior part, which is convex before, concave backwards, horizontal and plain in most of them above and below; their anterior and posterior surfaces having several holes made in their thin external plate, both for the firmer connexion of the ligaments, and for the passage of vessels into their cellular substance. Between these bodies of each two adjoining vertebræ, a substance between the nature of ligament and cartilage is interposed; which is composed of concentric curve fibres, the exterior of which are the most solid and hard, while those in the centre are very soft and full of a glairy liquor; and therefore this substance was called by the antients ligamentum mucosum. This is firmly fixed to the horizontal surfaces of the bodies of the vertebræ, and therefore not only allows these bones to recede from each other, and to be press'd closer together without breaking, but serves to connect them, in which it is assisted by a strong membranous ligament, which lines all their concave surface, and by still a stronger ligament that covers all their anterior convex surface. It may be observed, as a general rule, notwithstanding some exceptions, that the bodies of the vertebræ are smaller and more solid above, but as we reckon downwards, appear larger and more spongy, and that the cartilages between them are thick, and the surrounding

ing ligaments strong in proportion to the largeness of the vertebræ, and the quantity of motion they are to perform : by which disposition the greater weight is supported on the broadest best secured base, and the middle of our body is allowed a large and secure motion, which is of considerable benefit. From each side of the body of each vertebra, a bony bridge is produced backwards and to a side; from the posterior extremity of which, one slanting process rises, and another descends; the smooth, and what is generally the flattest side of each of these four processes, which are called the oblique, is covered with a smooth cartilage, and the two inferior oblique processes of each vertebra are fitted to, and articulated with, the two superior or ascending oblique processes of the vertebra below. From between the superior and inferior oblique process of each side, the vertebra is stretched out laterally in form of a process, that is universally named transverse. From the posterior roots of the two oblique, and of the transverse process of each side, a broad oblique bony plate is extended backwards; where these meet, the seventh and last process of the vertebræ takes its rise and stands out backwards; this being generally sharp-pointed, and narrow-edged, has therefore been called spinal process, from which this whole chain of bones has got the name spina. Besides the common ligament which lines all the interior surface of these processes as well as of the bodies, there are particular ligaments that connect the processes of each two contiguous vertebræ. The substance of the processes is considerably stronger and firmer than that of the bodies of the vertebræ, having a thicker external plate, and without so many large holes in it. The seven processes considered jointly, as forming the posterior shares of the vertebræ, are hollow at their anterior middle part; which concavity, joined with that at the posterior part of the bodies, makes one great foramen, which answers to such another in the vertebræ above and below; therefore the foramina of all the vertebræ taken together, form a long great conduit, which is widened or straitened in proportion to the size of the medulla spinalis, which it contains. See the article MEDULLA.

In the lateral bridges, which join the bodies to the processes of each vertebra, a semicircular notch is observable both above

and below; which, exactly corresponding with others in the contiguous bones, when the vertebræ are joined, form a round hole in each side, between each two vertebræ, through which the nerves that proceed from the medulla spinalis and the blood vessels pass. The articulations then of these true vertebræ are plainly double; for their bodies are joined by synchondrosis, and their oblique processes are articulated by the third sort of ginglymus. Hence it is evident, that their centre of motion is altered in different positions of the trunk. For when we bow forwards the superior moved part bears entirely on the bodies of the vertebræ; if we bend back, the oblique processes support the weight; if we recline to one side, we rest upon the oblique processes of that side and part of the bodies; if we stand erect, all the bodies and oblique processes have their share in our support. See ARTICULATION.

There are in all twenty-four vertebræ: the neck consists of seven; and in these, as in the others, we are to observe some things in general; and afterwards, other things in particular. The vertebræ of the neck are smaller than those of the back; but they are of a firmer consistence, and harder: their body is more compressed than in the others, and is sinuated on the other part, and convex below. Most of these vertebræ have nine apophyses; the transverse and posterior ones, called the spinose apophyses, are usually bifurcated: the transverse ones are perforated also, for the passage of the vertebral vessels to the head. In the consideration of the vertebræ of the neck singly, we are to observe, that the upper one has a peculiar name: it is called atlas. This wants the body and the spinose apophyses, and approaches to the figure of a ring: its substance is more solid than that of any other, and it receives both above and below; but it is not received itself. The head is articulated at its interior part, and it is by means of this articulation that the head is bent, and extended. The proper foramen is greater in this than in any other vertebra, which arises from its wanting the body: the transverse processes are also longer than in the others. It has also a peculiar semicircular ligament, by which it embraces the dentiform process of the succeeding vertebra. The second vertebra is called epistrophæus, and axis; in which we are to observe the dentiform or odontoide process,

process, just mentioned; whereby it articulates in the manner of an hinge, with the first vertebra, and the rotatory motion of the head is performed by means of it. The third vertebra is also called axis by some, though it has nothing to warrant such a name; for there is nothing particular to be observed in this, or any of the succeeding vertebrae of the neck, more than has been already taken notice of them in general. The dorsum, or back, has twelve vertebrae; of which we may remark in general, that they are of a middle size between those of the neck, and those of the loins: their spinose apophyses are also very long, and, except in the two last, very much inclined: the cartilages between the bodies of these, are smaller than those of the neck: the two transverse apophyses are thick, and have a depression in them for the articulation with the ribs. The first vertebra of the back is called the axillary, or eminent vertebra; and to it is joined the upper rib. See RIBS.

The vertebrae of the loins are five; of which we may observe in general, that their bodies, and also the intervening cartilages, are very thick; the transverse apophyses very long, but smaller than those of the back; the spinose apophyses are thick, straight, and set farther asunder than in the others, to give way to a laxer motion in this part.

Some have given particular names to the vertebrae of the back and loins; but this is not necessary, as they are sufficiently distinguished by numbering them. For the luxations, fractures, and other injuries of the vertebrae, see the articles SPINE, RIBS, LUXATION, &c.

VERTEX, in anatomy, denotes the crown of the head, or the uppermost part situated between the sinciput and occiput. See the article HEAD.

Hence vertex is also used, figuratively, for the top of other things; thus, the vertex of a cone, pyramid, &c. is the top of any one of these figures. See CONE, &c. The vertex of an angle is the angular point; and those angles, which, being opposite to one another, do touch only in the angular point, are called vertical angles: such are the angles ABC and DBE (plate CCXC. fig. 5.) wherein the sides AB and CB of one of them are only continuations of the legs of the other, BE and BD; and such angles are demonstrated to be equal.

The vertex of any plane figure, is the

angle opposite to the base; and the vertex of a curve, is the point from which the diameter is drawn, or the intersection of the diameter and curve.

VERTEX of a glass, in optics, the same with the pole thereof.

VERTEX is also used, in astronomy, for the point of heaven perpendicularly over our heads, properly called the zenith. See the article ZENITH.

Path of the VERTEX, the circle described by the vertical point during one revolution of the earth about its axis.

VERTICAL CIRCLE, in astronomy, a great circle of the sphere passing through the zenith and nadir, and cutting the horizon at right angles: it is otherwise called azimuth. See AZIMUTH.

Prime VERTICAL, is that vertical circle or azimuth which passes through the poles of the meridian; or which is perpendicular to the meridian, and passes through the equinoctial points. See AZIMUTH.

VERTICAL of the sun, is the vertical which passes through the center of the sun at any moment of time.

VERTICAL PLANE, in perspective, is a plane perpendicular to the geometrical plane, passing through the eye, and cutting the perspective plane at right angles.

VERTICAL PLANE, in conics, is a plane passing through the vertex of the cone, and parallel to any conic section. See the article PLANE.

VERTICAL LINE, in conics, is a right line drawn on the vertical plane, and passing through the vertex of the cones. See the article LINE.

VERTICAL DIAL, is a sun-dial drawn on the plane of a vertical circle, or perpendicular to the horizon. See DIAL.

VERTICAL POINT, in astronomy, the same with vertex or zenith.

VERTICILLATE PLANTS, are such as have their flowers intermixed with small leaves growing in a kind of whorls about the joints of a stalk; as penny-royal, hore-hound, &c. See PLANT.

The peculiar characteristic of this genus of plants, according to Mr. Ray, is, that their leaves grow in pairs, one just against another, on the stalk; the flower is monopetalous, but usually grows down with a kind of lip, or turning, something like the form of a helmet; there are four seeds after each flower, to which the perianthium of the flower serves instead of a capsula seminalis.

VERTICITY, is that property of the loadstone, whereby it turns, or directs itself

to some peculiar point. See MAGNET.
VERTIGO, in medicine, a disease in which the head seems to turn round.

This, according to Dr. Willis, is a disorder in which visible objects seem continually to turn round, whilst the patients are affected with a perturbation or confusion of the animal spirits in the brain, which hinders their influx into the nerves. Hence it is, that the visive and locomotive faculties often fail to such a degree, that the patient is ready to drop down, and complains of darkness. Etmuller divides it into three kinds; the first of which is a simple vertigo, in which there is only a transient and short-continued gyration of objects. The second is a dark vertigo, or scotomia, when the eyes are darkened, or so affected, as if several colours were before them. The third is the vertigo caduca, in which the patient presently falls down.

A vertigo may be produced by every cause which can distend, press, or contract the arteries; such as sudden fear, surprize, ebriety, and voracity, by which the regular influx and reflux of the animal spirits into the optic nerves and retina are prevented. Sometimes, also, it may be produced by an acid, or any peccant humour, lodged in the stomach, and velleicating its nerves, which communicate with the retina; for which reason the hypochondriac and hysteric passions may produce a vertigo.

With respect to the cure, the regimen in general, ought to be the same with that in the apoplexy or epilepsy. If the patient is plethoric, a due quantity of blood is to be taken away; and if a nausea, loss of appetite, or any other disorder of the stomach remain, an emetic is to be prescribed; then cathartics and specifics are to be ordered. According to Mayerne, calamus aromaticus, in whatever form, is good for a vertigo, and esteemed a secret for that disorder. The same author informs us, that a german physician cured a great many of vertigoes, by pills made of sugar of lead and cypreis-turpentine; four or five grains of which were to be taken for a dose, and their use persisted in for some days. Glisson, as Bates informs us, after all other medicines had failed, was cured of a severe vertigo, of three weeks continuance, by shaving his head, and applying to it a plaster of the flowers of sulphur and whites of eggs. Some order a caustic, or a seton, to be applied to the back part of

the neck; a cautery to the bregma, and Bates's epileptic electuary, or Fuller's peruvian epileptic electuary, to be used internally.

Willis informs us, that after he had in vain tried all other medicines, he, with success, prescribed the following powder: Take of the powder of the roots of male piony, two ounces; of the flowers of male piony, one ounce; of peacocks dung, of the whitest kind, half a pound; and of white sugar, two ounces: reduce to a powder, the dose of which is to be about the quantity of a spoonful twice a day, drinking after it a draught of a decoction of sage and rosemary, impregnated with coffee.

Heister orders camphorated spirit of wine alone, or mixed with spirit of hartshorn, to be applied to the top of the head and temples. And when the disorder proceeds from crudities in the stomach, he advises to prepare and dissolve them by neutral salts, that they may be afterwards evacuated by an emetic, or purge. After this, the patient should use stomachics and cephalics; as also a moderate quantity of wine at meals, which should be sparing. Pyrmont-water is also said to be excellent in this case.

VERVAIN, *verbena*, in botany. See the article **VERBENA**.

VERUE, a town of Piedmont, situated on the river Po, twenty miles north east of Turin.

VERU-MONTANUM, in anatomy, a kind of little valve, in the place where the ejaculatory ducts enter the urethra.

Its use is to prevent the urine, in passing the urethra, from getting in at these ducts, and so mixing with the semen.

VERY LORD, and **VERY TENANT**, are those that are immediate lord and tenant to one another. See the article **LORD**.

VESICA, in anatomy, a bladder, a membranous or skinny part in which any humour is contained. See **BLADDER**.

VESICATORY, *vesicatorium*, an external medicine, serving to raise a blister; whence, also, it is itself, though improperly, called a blister.

Vesicatories are unguents, cataplasms, or plasters, made of sharp irritating medicines, which have a faculty of drawing the humours from within, outwards, inflaming and ulcerating the skin, and raising vesicæ or bladders, whence their denomination vesicatory.

We have vesicatories made of cantharides, euphorbium, figs, sublimate of mercury,

cury, lapis infernalis, mustard, anacardium, squills, briony, vinegar, pepper, leaven, &c. which are incorporated and made up with honey, gums, resins, &c. to bring them to the consistance required.

VESICULA, VESICLE, a diminutive of *vesica*, signifying a little bladder.

The lungs consist of *vesiculæ*, or lobules of *vesiculæ*, admitting air from the bronchia; and not only air, but also dust, &c. There are several other parts in the body which bear this appellation; as the *vesicula-fellis*, or gall-bladder, *vesiculæ feminales*, &c. See the article *GALL*, &c.

VESPA, the *WASP*, in zoology. See *WASP*.

VESPER, or *HESPER*, in astronomy. See the article *HESPER*.

VESPERS, in the church of Rome, denote the afternoon service, answering, in some measure, to the evening prayers of the church of England. See the articles *PRAYER* and *SERVICE*.

VESPERTILIO, the *BAT*, in zoology, a genus of quadrupeds, of the order of the *feræ*, the characters of which are these: the fore-teeth of the upper jaw are six in number, acute, and distant from each other; the fore-teeth of the lower jaw are also six, and acute, but contiguous: the canine teeth are two both above and below, on each side: the feet have each five toes; and the fore-feet have the toes connected by a membrane, and expanded into a sort of wings, whereby it flies; whence this animal has been generally, but with the utmost impropriety, ranged among the birds.

The common bat is about the bigness of a mouse, and very much resembles it in shape and colour. There are several other species of this creature, some with, and others without, a tail.

VESPERTILIONUM ALÆ, *BATS-WINGS* in anatomy, a name given to the two broad ligaments which connect the bottom of the uterus to the bones of the ilium. See the article *UTERUS*.

VESPRIN, a town of Lower Hungary, fifty miles south-west of Buda.

VESSEL, *vas*, denotes in general any thing for holding liquors; such are our domestic cups, pots, &c. as also the retorts, matras, crucibles, &c. of the chemists. See *RETORT*, *LABORATORY*, &c.

In anatomy, all the parts which contain or convey a fluid, are called vessels; as the veins, arteries, lymphatics, &c. See the articles *VEIN*, *ARTERY*, &c.

Some also extend the word vessel to the nerves, as supposing them the conduits of

the animal spirits. See the articles *NERVES* and *ANIMAL SPIRITS*.

VESSEL, in navigation, a general name for all sorts of ships. See the article *SHIP*.

VESTALIA, in roman antiquity, a festival celebrated in honour of the goddess *Vesta*, on the fifth of the ides of June; that is, on the ninth of that month.

VESTALS, *vestales*, among the ancient Romans, were priestesses of the goddess *Vesta*, and had the perpetual fire committed to their charge: they were at first only four in number, but afterwards increased to six; and it does not appear, that their number ever exceeded six, among whom one was superior to the rest, and called *vestalis maxima*.

The vestals were chosen from six to ten years of age, and obliged to strict continency for thirty years; the first ten of which were employed in learning the ceremonies of religion, the next ten in the performance of them, and the ten last in teaching them to the younger vestals.

The habit of the vestals consisted of an head-dress, called *infula*, which sat close to their heads, and from whence hung certain laces called *vittæ*; a kind of surplice made of white linen, and over it a purple mantle with a long train to it.

VESTIBLE, *vestibulum*, in architecture, a kind of entrance into a large building; being an open place before the hall, or at the bottom of the stair-case. Vestibles, intended for magnificence, are usually between the court and the garden.

The Romans had vestibles at the entrance of their houses, for sheltering those persons who were obliged to stand at the door; and we have now vestibles of a like kind in many old churches, houses, &c. usually called porches. See the article *PORCH*.

The term vestibile is sometimes also used for a little anti-chamber, before the entrance of an ordinary apartment.

VESTIBLE of the ear, in anatomy, a cavity forming the middle part of the labyrinth of the ear. See the article *EAR*.

VESTIGIA, a latin term frequently used, by english writers, for the traces or footsteps which any thing has left behind it.

VESTRY, a place adjoining to a church, where the vestments of the minister are kept; and also a meeting at such place, consisting of the minister, church-wardens, and chief men of most parishes, who make a parish vestry or meeting. By custom

custom there are select vestries, being a certain number of persons chosen to have the government of the parish, make rates, and take the accounts of church-wardens, &c. And it is here to be observed, that when any rates are made, the parishioners must have notice of a vestry held for that purpose; in which case all that are absent shall be concluded by a majority of the parishioners present, who in construction of law are the whole parish. Vestries of parishes are to be consulted by parish officers; and if a parishioner, who has a right to be present and vote at a vestry, be shut out of the vestry-room, action of the case lies.

VESTURE, or **INVESTITURE**, in law. See the article **INVESTITURE**.

VESUVIUS, a famous volcano, or burning mountain, situated only six miles east of the city of Naples, in Italy. See the article **VULCANO**.

VETCH, *vicia*, in botany, a genus of the diadelphia-decandria class of plants, with a papilionaceous flower; and its fruit is a long, bivalve, and coriaceous pod, containing several roundish seeds.

VETCH also makes part of the names of other plants; as the bitter vetch, horse-shoe vetch, &c. See the articles **ORBUS** and **HIPPOCREPIS**.

VETERAN, among the antient Romans, an appellation given to a soldier who was grown old in the service, or had made a certain number of campaigns.

VETERNUS, or **LETHARGY**, in medicine. See the article **LETHARGY**.

VETITUM NAMIUM, in law, imports a forbidden distress; such, *e. gr.* is that when the bailiff of a lord distrains beasts or goods, and the lord forbids his bailiff to deliver them when the sheriff comes to replevy them, and to that end drives them to places unknown.

VEXES, or *Ne injuste VEXES*, in law. See the article **NE INJUSTE**.

VIA-LACTEA, in astronomy, the milky-way, or galaxy. See **GALAXY**.

VIA-SOLIS, *the sun's way*, in astronomy, is used, among some astronomers, for the ecliptic line, so called, because the sun never goes out of it. See **ECLIPTIC**.

VIE PRIMÆ, first passages, among physicians, are the œsophagus, stomach, and guts; including the whole length of the alimentary duct, or canal, from the mouth to the sphincter ani.

VIALES, in mythology, a name given among the Romans to the gods who had

the care and guard of the roads and highways.

The *dii viales*, according to Labeo, were of the number of those gods called *dii animales*, who were supposed to be the souls of men changed into gods; and were of two kinds, *viz.* the *viales* and *penates*. See **LARES**.

VIANA, a town of Navarre, in Spain, situated on the river Ebro, forty-six miles south-west of Pampeluna.

VIANA is also a port-town of Portugal, thirty-six miles north of Oporto.

VIANDEN, a town of Luxemburg, twenty miles north of the city of Luxemburg.

VIATICUM, in the church of Rome, an appellation given to the eucharist, when administered to persons at the point of death. See the article **EUCCHARIST**.

VIATOR, in roman antiquity, an appellation given in common to all officers of any of the magistrates; as lictors, ædiles, censors, scribes, cryers, &c. See the article **LICTOR**, &c.

VIBEX, is sometimes used, by physicians, for a black and blue spot in the skin, occasioned by an afflux or extravasation of blood.

VIBRATION, in mechanics, a regular reciprocal motion of a body, as a pendulum, &c. which, being freely suspended, swings or oscillates, first this way then that. See the article **PENDULUM**.

VIBRATION is also used, in physics, for divers other regular alternate motions; thus sensation is supposed to be performed, by means of the vibratory motion of the nerves, begun by external objects and propagated to the brain.

VIBURNUM, in botany, a genus of the pentandria-trigynia class of plants, with a monopetalous, campanulated flower, semiquinquefid at the limb; the fruit is roundish unilocular berry, containing single, osseous, compressed, and striate seed.

This genus comprehends the *tinus*, *laurustine*; the *opulus*, or water-elder; and the *viburnum* of authors, called in english the way-faring-tree.

VICAR, *vicarius*, a person appointed, deputy to another, to perform his functions in his absence, and under his authority.

VICAR, in the canon law, denotes a priest of a parish, the predial tithes whereof are impropriated or appropriated; that is, belong either to a chapter, religious house, &c. or to a layman, who receives them.

them, and only allows the vicar the small tithes or a convenient salary, antiently called *portio congrua*.

VICAR-GENERAL, was a title given by king Henry VIII. to Thomas Cromwell, earl of Essex, with full power to oversee the clergy, and regulate all matters relating to church affairs.

VICE, *vitium*, in ethics, is ordinarily defined an elective habit, deviating, either in excess, or defect, from the just medium wherein virtue is placed. See the articles **HABIT**, **VIRTUE**, &c.

VICE, in smithery, and other arts employed in metals, is a machine, or instrument, serving to hold fast any thing they are at work upon, whether it is to be filed, bent, rivetted, &c. To file square, it is absolutely necessary that the vice be placed perpendicular with its chaps parallel to the work-bench.

Hand-VICE, is a small kind of vice serving to hold the lesser works in, that require often turning about.

Of these there are two kinds, the broad-chapped hand-vice, which is that commonly used; and the square-nosed hand-vice, seldom used but for filing small round work. See **SMITHERY**.

VICE is also a machine used by the glaziers to turn or draw lead into flat rods, with grooves on each side to receive the edges of the glass.

VICE is also used, in the composition of divers words, to denote the relation of something that comes instead, or in the place, of another; as vice-admiral, vice-chancellor, vice-chamberlain, vice-president, &c. are officers who take place in the absence of admirals, &c. See the articles **ADMIRAL**, **CHANCELLOR**, &c.

VICE-ROY, a governor of a kingdom, who commands in the name and stead of a king, with full and sovereign authority. See the article **KING**.

VICE VERSA, a latin phrase, importing on the contrary: thus, as the sun mounts higher and higher above the horizon, the shadows of things decrease; and *vice versa*, as he descends lower, they increase.

VICH, a town of Catalonia, in Spain, 30 miles north of Barcelona.

VICIA, the **VETCH**, in botany. See the article **VETCH**.

VICISSITUDE, the regular succession of one thing after another; as the vicissitude of day and night, of the seasons, &c.

VICOVARO; a town of Italy, forty miles north-east of Rome.

VICOUNT, in old law-books, signifies

the same with sheriff. See **SHERIFF**.

VICOUNT, or **VISCOUNT**, is also a degree of nobility next below a count, or earl, and above a baron. See the articles **NOBILITY**, **EARL**, &c.

VICOUNTIEL, in law-books, something belonging to, or falling within the sheriff's jurisdiction: thus writs vicountiels are writs triable in the sheriff's court; and there are certain vicountiel rents, whereof the sheriff keeps a particular roll, that usually comes under the title of *firma comitatus*.

Also vicountiel jurisdiction, is that which belongs to officers of a county; as sheriff, coroner, escheator, &c. See **SHERIFF**, &c.

VICTIM, *victim*, denotes a bloody sacrifice offered to some deity, of a living creature, as a man or beast, which is slain to appease his wrath, or obtain some favour. See the article **SACRIFICE**.

VICTIMARIUS, in antiquity, a minister or servant of the priest, whose office was to bind the victims, and prepare the water, knife, and other things necessary for the sacrifice. See **SACRIFICE**.

To the victimarii it also belonged to knock down and kill the victims, in order to which they stood close by the altar naked to the waist, but crowned with laurel; and holding a hatchet or a knife up, asked the priest leave to strike; saying, *agne?* whence they were called agones and cultellarii. See **AGON**.

When the victim was killed, they opened it, and after viewing the entrails, took them away, washed the carcase, sprinkled the flour on it, &c. The same victimarii lighted the fire wherein books were condemned to be burnt.

VICTORIA, or **VITORIA**, a town of the province of Biscay, in Spain, thirty miles south of Bilbao.

VICTORY, *vicloria*, the overthrow or defeat of an enemy, in war or combat.

VICTUALLING-OFFICE, an office kept on Tower-hill, London, for the furnishing his majesty's navy with victuals. See the article **NAVY**.

It is managed by seven commissioners who have their inferior officers, as secretaries, clerks, &c. besides agents in divers parts of Great Britain, Ireland, &c. See the article **COMMISSIONERS**, &c.

VICTUALS, signifies any sustenance, or things necessary to live upon, as meat and provisions; which are to be sold at a reasonable price, assessed by justices, &c. on pain of forfeiting double the value. By the custom of some manors, they choose yearly

yearly surveyors of victuals. See **ASSISE**.
VIDAMES, certain officers under the bishops of France, for the administration of justice, and preservation of the temporalities of the bishoprics.

VIDIN, or **WIDIN**, a town of European Turkey, in the province of Servia, situated on the river Danube, in east long. 24°, and north lat. 43° 50'.

VIENNA, the capital city of the circle of Austria and of the German empire, is situated on the Danube, in east long. 16° 20', and north lat. 48° 20'.
 Vienna is an archbishop's see, and has a celebrated university.

VIENNE, a town of Dauphine, in France, situated on the river Rhone, 18 miles south of Lyons. It is an archbishop's see.

VIET ARMIS, in law, are words made use of in indictments and actions of trespass, to shew the violent commission of any trespass or crime; but in an appeal of death, or where a person is killed with a weapon, these words are not held necessary, because the violence is implied.

VIEW, in law, signifies the particular act of viewers; as where a real action is brought, and the tenant does not certainly know what land it is the defendant requires; then he may pray that the jury may view the same, that is to say, see the land that is claimed. But it is held, that in all cases of viewing, the thing in controversy is only to be shewn to the jurors, and no evidence can be given relating to it on either side: and here if waste be alleged to be done in every room of a house, the view of the house generally is sufficient.

VIEW of frank pledge, is the office which the sheriff in his county-court, the steward in the leet, or the bailiff in his hundred, performs in looking to the king's peace, and seeing that every man be in some pledge.

VIGEVANO, a town of the duchy of Milan, in Italy, sixteen miles south-west of Milan.

VIGILS, in church-history, are the fasts appointed before certain festivals, in order to prepare the mind for a due observation of the ensuing solemnity.

VIGINTIVIRATE, a tribunal or court among the ancient Romans, first established by Cæsar, consisting of twenty members, three of whom judged of all criminal matters; three others had the inspection of the coins; four others had the inspection of the streets of Rome; and

the rest were judges of civil affairs.

VIGNAMONT, a town of the bishopric of Liege, in Germany, two miles north of Huy.

VIGO, a port-town of Galicia, in Spain, 70 miles south-east of Cape Finisterre: west long. 9° 18', north lat. 42° 15'.

VILLA-BOHIM, a town of Portugal, ten miles south-west of Elvas.

VILLA-FRANCA, the name of several towns, one in Piedmont, three miles east of Nice; another of Catalonia, eighteen miles west of Barcelona; a third, the capital of St. Michael, one of the Azores; and a fourth, a town of Estremadura, in Spain, fifty-four miles south-east of Salamanca.

VILLA-FRANCHE, a town of Orleans, in France, twelve miles north of Lyons.

VILLACH, a town of Carinthia, in Germany, twenty miles west of Clagenfurt.

VILLAGE, an assemblage of houses, inhabited chiefly by peasants and farmers, and having no market, whereby it is distinguished from a town. See the articles **CITY** and **TOWN**.

Fleta tells us, that the difference made between a mansion, a village, and a manor, is this, *viz.* a mansion may consist of one or more houses, but must be of one dwelling place, and none near it; for if other houses are contiguous, it is then a village; and a manor consists of several villages, or of one alone.

Where in legal proceedings a place is named generally, it shall be taken for a vill, because as to civil purposes the kingdom was first divided into vills; yet it has been held, that a vill and a parish shall be intended the same.

VILLAIN, or **VILLEIN**, *villanus*, in our ancient customs, denotes a man of servile and base condition, *viz.* a bondman or servant: and there were antiently two sorts of bondmen or villains in England; the one termed a villain in gross, who was immediately bound to the person of his lord and his heirs; the other a villain regardant to a manor, he being bound to his lord as a member belonging and annexed to the manor whereof the lord was owner; and he was properly a pure villain, of whom the lord took redemption to marry his daughter, and to make him free; and whom the lord might put out of his lands and tenements, goods and chattels at his will, and beat and chastise, but not maim him.

VILLA REAL, the name of two towns, the

the one in Spain, thirty miles north of Valencia; and the other in Portugal, fifty miles east of Porto.

VILLA DEL REY, a town of Spain, ten miles north of Badajoz.

VILLA RICA, a port-town of Mexico, situated on the gulph of Mexico, in west long. 100° , and north lat. 20° .

VILLA VICIOSA, the name of two towns of Spain, one forty-seven miles north-east of Madrid; and the other a port-town of Asturias, twenty-two miles north-east of Oviedo: west long. $6^{\circ} 6'$, north lat. 43° .

VILLENA, a town of New Castile, in Spain, forty miles north of Murcia: west long. $1^{\circ} 15'$, north lat. $38^{\circ} 46'$.

VILLENAGE, a kind of antient tenure, whereby the tenant was bound to do such services as the lord commanded, or such as were fit for villains or bondmen to perform.

VILLENOUS, or **VILLAINOUS JUDGMENT**, in law, that which degrades and casts shame and reproach upon the offender; so that he shall not be of any credit afterwards, nor shall it be lawful for him to approach the king's court, &c.

VILLI, among botanists, a kind of down like coarse hair, or the grain or shag of plush, with which some trees abound.

VILLOSE, or **VILLOUS**, something abounding with villi, or fibres like coarse hairs: such is one of the coats of the stomach. See the article **STOMACH**.

VILVORDE, a town of Brabant, seven miles north of Brussels.

VINALIA, in roman antiquity, a festival on the ninth of the kalends of May, in honour both of Jupiter and Venus.

VINCA, the **PERIWINKLE**, in botany, a genus of the pentandria-monogynia class of plants, the flower of which consists of a single saucer-like petal, with an horizontal limb, divided into five segments: the pericarpium consists of two erect, cylindric, and long follicles, formed of one valve, and opening longitudinally: the seeds are numerous, oblong, cylindric, and sulcated.

Cape VINCENT, the most south-west promontory of Portugal: west long. 10° , and north lat. $36^{\circ} 55'$.

St. VINCENT, one of the Caribbee-islands, seventy-five miles west of Barbadoes.

St. VINCENT, is also a province of Brazil, bounded by the Rio Janiero on the north, by the Atlantic on the east, by the province of del Rey on the south, and by that of the Spanish La Plata on the west,

VINCULUM, in mathematics, a character in form of a line, or stroke, drawn over a factor, divisor, or dividend, when compounded of several letters or quantities, to connect them, and shew they are to be multiplied, or divided, &c. together by the other term. Thus $d \times a + b - c$ shews that d is to be multiplied into $a + b - c$.

VINDEMIATING, the gathering of the grapes, or other ripe fruits, as the apple, pears, cherries, &c. See **VINTAGE**.

VINDEMIATRIX, or **VINDEMIATOR**, a fixed star of the third magnitude in the constellation virgo, whose latitude is $16^{\circ} 12' 34''$ north, and longitude $5^{\circ} 37' 40''$ of libra, according to Mr. Flamsteed's catalogue.

VINDICATION, or **CLAIMING**, in the civil law, an action arising from the property a person has in any thing; or a permission to take or seize a thing, as one's own, out of the hands of a person, whom the law has doomed not to be the true proprietor.

VINE, *vitis*, a noble plant or shrub of the creeping kind, famous for its fruit, or grapes, and for the liquor they afford. See the article **WINE**.

The vine constitutes a genus of the pentandria-monogynia class of plants, the flower of which consists of five small, deciduous, and rude petals, growing together at their extremities; and its fruit is a large roundish berry, containing five osseous, semiorbicular, and turbinatocordated seeds, narrow at the base.

Our gardeners find, that vines are capable of being cultivated in England, so as to produce large quantities of grapes; and those ripened to such a degree, as may afford a good substantial vinous juice. Witness the vineyards in Somersetshire; particularly that famous one at Bath. In effect, it does not seem so much owing to the inclemency of our English air, that our grapes are generally inferior to those of France, as to the want of a just culture. Those fitted for the English climate, Mr. Mortimer finds to be the black grape, the white muscadine, parsley-grape, muscadilla, white and red frontinac. Mr. Bradley recommends the July-grape, the early sweet water-grape, lately brought from the Canaries, and the Arbois, or french sweet water-grape: all which, if well managed, and the weather favourable, are ripe by the middle of August. He also recommends the claret and Burgundy-grapes.

Vines are propagated either by layers, or cuttings; that is, either by laying down the young branches, as soon as the fruit is gathered, or by making plantations of slips, or cuttings, at that time. Mr. Mortimer says, it may be done any time in the winter before January; though Bradley says, he has done it, with success, in March and April.

For the best soil for vines, and the method of cultivating them, see the article VINEYARD.

VINEGAR, *acetum*, an acid penetrating liquor, prepared from wine, cyder, beer, &c. of considerable use both as a medicine and sauce. See the articles WINE CYDER, &c.

The process of turning vegetable matters to vinegar, is thus delivered by Dr. Shaw: take the skins of raisins, after they have been used in making wine; and pour three or four times their own quantity of boiling water upon them, so as to make a thin aqueous mixture. Then set the containing cask, loosely covered, in a warmer place than is used for vinous fermentation; and the liquor in a few weeks time will become a clear and sound vinegar; which being drawn off from its sediment, and preserved in another cask, well stopped down, will continue perfect, and fit for use.

This experiment shews us a cheap and ready way of making vinegar from refuse materials; such as the husks of grapes, decayed raisins, the lees of wine, grounds of ale, beer, &c. which are frequently thrown away as useless. Thus, in many wine countries, the marc, rape, or dry pressing of grapes are thrown in heaps, and suffered to putrify unregarded; though capable of affording as good vinegar, as the wine itself. In some places they bury copper-plates in these husks, in order to make verdigrease; but this practice seems chiefly confined to the southern parts of France. Our present experiment shews us how to convert them to another use; and the direction extends to all the matters that have once undergone, or are fit to undergo, a vinous fermentation, for that all such matters will afford vinegar. Thus all our summer-fruits in England, even blackberries; all the refuse washings of a sugar-house, cyder pressings, or the like, will make vinegar, by means of water, the open air, and warmth. See the article VERDEGREASE.

The whole process, whereby this change is effected, deserves to be attentively considered. And, first, the liquor to be thus changed, being kept warmer than in vinous fermentation, it, in a few days, begins to grow thick, or turbid; and without throwing up bubbles, or making any considerable tumult, as happens in vinous fermentation, deposits a copious sediment. The effect of this separation begins to appear first on the surface of the liquor, which gathers a white skin, that daily increases in thickness, till at length it becomes like leather; and now, if continued longer in this state, the skin turns blue, or green, and would at last grow solid, and putrify: therefore, in keeping down this skin as it grows, and thrusting it gently down to the bottom of the vessel, consists much of the art of vinegar-making, especially from malt. For the difference between vinous and acetous fermentation, see the article FERMENTATION.

Method of making Cyder-VINEGAR. The cyder (the meanest of which will serve the purpose) is first to be drawn off fine into another vessel, and a quantity of the must, or pouz of apples, to be added: the whole is set in the sun, if there be a conveniency for the purpose; and, at a week or nine days end, it may be drawn off. See the article CYDER.

Method of making Beer-VINEGAR. Take a middling sort of beer, indifferently well hopped; into which, when it has worked well, and is grown fine, put some rape, or husks of grapes, usually brought home for that purpose: mash them together in a tub; then, letting the rape settle, draw off the liquid part, put it into a cask, and set it in the sun as hot as may be; the bung being only covered with a tile, or slate stone: and in about thirty or forty days, it will become a good vinegar, and may pass in use as well as that made of wine, if it be refined, and kept from turning musty.

Or thus: to every gallon of spring-water, add three pounds of Malaga-raisins; which put into an earthen jar, and place them where they may have the hottest sun from May till Michaelmas: then, pressing all well, turn the liquor up in a very strong iron-hooped vessel, to prevent its bursting: it will appear very thick and muddy, when newly pressed; but will refine in the vessel, and be as clear as wine. Thus let it remain untouched

touched for three months, before it be drawn off, and it will prove excellent vinegar.

Method of making Wine-VINEGAR. Any sort of vinous liquor, being mixed with its own fæces, flowers, or ferment, and its tartar, first reduced to powder; or else with the acid and austere stalks of the vegetable from whence the wine was obtained, which hold a large proportion of tartar: and the whole being kept frequently stirring in a vessel which has formerly held vinegar, or set in a warm place full of the steams of the same, will begin to ferment a-new, conceive heat, grow sour by degrees, and soon after turn into vinegar.

The remote subjects of acetous fermentation are the same with those of vinous; but the immediate subjects of it are all kinds of vegetable juices, after they have once undergone that fermentation which reduces them to wine: for it is absolutely impossible to make vinegar of must, the crude juice of grapes, or other ripe fruits, without the previous assistance of vinous fermentation.

The proper ferments for this operation, whereby vinegar is prepared, are, 1. The fæces of all acid wines. 2. The lees of vinegar. 3. Pulverised tartar; especially that of rhenish wine, or the cream or crystals thereof. 4. Vinegar itself. 5. A wooden vessel, well drenched with vinegar, or one that has been long employed to contain it. 6. Wine that has often been mixed with its own fæces. 7. The twigs of vines, and the stalks of grapes, currants, cherries, or other vegetables of an acid austere taste. 8. Bakers-leaven, after it is turned acid. 9. All manner of ferments, compounded of those already mentioned.

The french use a method of making vinegar different from that above described. They take two very large oaken vessels, the larger the better, open at the top; in each whereof they place a wooden grate, within a foot of the bottom: upon these grates, they first lay twigs, or cuttings of vines, and afterwards the stalks of the branches, without the grapes themselves, or their stones; till the whole pile reaches within a foot of the brim of the vessels: then they fill one of these vessels with wine to the very top, and half fill the other; and with liquor drawn out of the full vessel, fill up that which was only half full before; daily repeating the same operation, and pouring the

liquor back from one vessel to the other; so that each of them is full, and half full, by turns.

When this process has been continued for two or three days, a degree of heat will arise in the vessel, which is then but half full, and increase for several days successively, without any appearance of the like in the vessel which happens to be full, during those days; the liquor whereof will still remain cool: and as soon as the heat ceases in the vessel that is half full, the vinegar is prepared: which, in the summer, happens on the fourteenth or fifteenth day from the beginning; but in the winter, the fermentation proceeds much slower: so that they are obliged to forward it by artificial warmth, or the use of stoves.

When the weather is exceeding hot, the liquor ought to be poured off from the full vessel into the other twice a-day: otherwise, the liquor would be overheated, and the fermentation prove too strong; whence the spirituous parts would fly away, and leave a vapid wine, instead of vinegar, behind.

The full vessel is always to be left open at the top, but the mouth of the other must be closed with a cover of wood, in order the better to keep down and fix the spirit in the body of the liquor; for otherwise, it might easily fly off in the heat of fermentation. The vessel that is only half full seems to grow hot, rather than the other, because it contains a much greater quantity of the vine-twigs and stalks, than that, in proportion to the liquor; above which the pile, rising to a considerable height, conceives heat the more, and so conveys it to the wine below. Vinegar is a medicine of excellent use in all-kinds of inflammatory and putrid disorders, either internal or external: in ardent, bilious fevers, pestilential and other malignant distempers, it is recommended by Boerhaave as one of the most certain sudorifics. Weakness, fainting, vomiting, hysterical and hypochondriacal complaints have also been frequently relieved by vinegar applied to the mouth and nose, or received into the stomach. Distilled vinegar has the same virtues, only in a stronger degree.

There are also medicated vinegars, as vinegar of antimony, of elder, litharge, roses, squills, treacle, &c. which derive their chief virtues from vinegar.

VINEYARD, *vinetum*. a plantation of vines. See the article VINE.

The

The best situation of a vineyard is on the declivity of an hill, lying on the south. See the article EXPOSURE.

For the planting of a vineyard, observe the following method. In the month of July, while the outermost coat of the earth is very dry and combustible, plough up the sward; denshire, or burn-beat it, according to art, and in January following, spread the ashes. The ground being thus prepared, cut your trenches across the hill from east to west, because the vines being thus in ranks, the rising and setting of the sun will by that means pass through the intervals, which it would not do if they were set in any other position, neither would the sun dart its rays upon the plants during the whole course of the day. See PLANTING. Afterwards strain a line, and dig a trench about a foot deep, place your sets in it about three feet distance from one another, trim off the superfluous roots, leaving no more than three or four eyes or buds upon that which is above ground, and plant them near half a foot deep, sloping after the manner the quick is commonly set, so as they may point up the hill. That done, take long dung or straw, and lay it on the trenches in a convenient thickness to cover the earth, and to preserve the roots from the dry piercing winds, which would otherwise scorching heats in summer; keep them well hoed, and free from weeds, and water them as occasion serves; the best time to plant is in January. See the article MANURE.

The first pruning of the new-set vine ought not to be till January, and then you should cut off all the shoots as near as you can, sparing but one of the most thriving, on which you are to leave only two or three buds, and so let all rest till May, the second year after planting. Then take care from time to time to destroy the weeds, and be sure to clear the roots of all suckers, which do but rob and draw out the virtue of your sets. The same method is to be followed the third year; then dig your whole vineyard, and lay it very level; taking care in this operation not to cut or wound any of the main roots with your spade. As for the younger roots, it is not so material, in regard that they will grow but the thicker; and this year you may enjoy some of the fruits of your vineyard,

which if answerable to your expectation will put you upon providing props for your vines, of about four feet long, which must be placed on the north-side of the plant. In May, rub off such buds as you suspect will produce superfluous branches. When the grapes are about the bigness of birding-shot, break off the branches with your hand at the second joint above the fruit, and tie the rest to the prop: here it is most advisable to break, and not cut your vine; because wounds made with a sharp instrument are not apt to heal, but cause the plants to bleed. See the articles PRUNING, LOPPING, &c.

The fourth year you would be likely to have three or four shoots to every plant; and therefore in December, cut off all the branches except one of the strongest and most thriving, which leave for a standard about four feet high, paring away the rest very close to the body of the mother-plant, which tie to your prop, till it be big enough to make a standard of itself. Neither must you suffer any shoot to break out but such as sprout at the top, four feet from the ground, all which sprouts the French usually prune off every year, and absolutely trust to the new sprouts that are only bearing shoots.

In August, when the fruit begins to ripen, break off such shoots as you find too thick; and if you perceive any plant bleed, rub some ashes on it; or, if that will not do, sear it with a hot iron. When upon stirring your vineyard it appears to be poor, prune the vines as before directed, and spread good dung, mixed with lime, over the whole ground, letting it lie all the winter to wash into the earth, mixing about ten bushels of lime with a load of dung, and if some ashes and soot be likewise thrown on, it will do well. Turn in this manure, about February, with a slight digging, but not too deep, which should be done in a dry season, and not in wet weather, lest it make the ground bind too much and occasion the growth of rank weeds. But to forward the ripening of grapes, and render them fruitful, the blood of beasts mixed with lime or soot, is very proper; laying it to the roots of the vines in December and July; and if the season be very dry, the watering them in August is a great advantage. See the article DUNGING.

As to the soil of a vineyard, it is agreed that

that nothing can be too dry for it; and as to the sorts of vines, none but the forward ones ought to be planted in England.

VINOUS, *vinosus*, something that relates to wine, or that has the taste and smell thereof. See the article **WINE**.

All vegetables, by a due treatment, afford a vinous liquor, as corn, pulse, nuts, apples, grapes, &c. A second fermentation, duly managed, turns any vinous liquor into an acetous one. The proper character and effect of fermentation are to produce either a vinous or an acetous quality in the body fermented. See the article **FERMENTATION**.

INTAGE, a crop of wine, or what is got from the vines each season. See **VINE**, **VINEYARD**, and **VINE**.

The word is also used for the time or season of gathering or pressing the grapes. See **GRAPES** and **Wine-PRESS**.

INTIMIGLIA, a port-town of Italy, in the territory of Genoa, situated on the Mediterranean, seventeen miles east of Nice, and one hundred south-west of Genoa-city.

INUM, a liquor or drink commonly called wine. See the article **WINE**.

INUM, in medicine, *vinum medicatum*, is particularly applied to several medicated wines, that is, medicinal preparations, whereof wine is the basis. The original intention of medicated wines, was for exhilarating medicines, which were to be continued for a length of time in the most familiar and agreeable form: by this means a course of remedies was complied with, notwithstanding the repugnance and aversion which the sick often manifest to those directly furnished from the shops; and hence the inferior sort of people had their medicated ales. Nevertheless, as vinous liquors are excellent for extracting the virtues of several simples, and are not fitted for keeping, they have been employed as officinal menstrua also; and substances of the greatest efficacy are trusted in this form. The most noted of these medicated wines to be met with in dispensatories, are the *vinum aleoticum*, or alkaline, aleotic wine: *vinum amarum*, or bitter wine: *vinum antimoniale*, or antimonial wine: *vinum aromaticum*, or aromatic wine: *vinum chalybeatum*, steel wine: *vinum croceum*, saffron wine: *vinum emeticum*, emetic wine: *vinum guaiacum*, guaiacum wine: *vinum ipecacoanhæ*, wine of ipecacoanha: *vinum millepeda-*

tum, wine of millepedes: *vinum peruvianum*, wine of peruvian bark: *vinum scorbuticum*, scorbutic wine; and *vinum viperinum*, viper wine.

VIOL, *viola*, a musical instrument of the same form with the violin, and struck like that with a bow. See **VIOLIN**.

There are viols of divers kinds. The first and principal, among us, is the bass-viol, called by the Italians *viola digamba*, or leg-viol, because held between the legs. It is the largest of all, and is mounted with six strings: its neck is divided in half notes by seven frets fixed thereon: its sound is very deep, soft and agreeable. The tablature, or music for the bass-viol, is laid down on six lines or rules. What the Italians call alto viola is the counter-tenor of this; and their tenore viola, the tenor. They sometimes call it simply the viol: some authors will have it the lyra, others the cithara, others the chelys, and others the testudo of the ancients. See **LYRA**, **CITHARA**, &c.

2. The love-viol, *viola d' amore*, which is a kind of triple-viol or violin, having six brass or steel strings, like those of the harpsichord, ordinarily played with a bow. This yields a kind of silver sound, which is very agreeable. 3. A large viol with forty-four strings, called by the Italians *viola di bardone*, but little known among us. 4. *Viola bastarda*, or bastard viol of the Italians; not used among us. Broffard takes it to be a kind of bass-viol mounted with six or seven strings, and tuned as the common one. 5. What the Italians call *viola di braccio*, arm-viol, or simply *braccio*, arm, is an instrument answering to our counter-tenor, treble, and fifth violin. 6. Their *viola prima*, or first viol, is really our counter-tenor violin; at least, they commonly use the cleff *C sol ut* on the first line to denote the piece intended for this instrument. 7. *Viola secunda* is much the same with our tenor-violin, having the cleff of *C sol ut* on the second line. 8. *Viola terza* is nearly our fifth violin, the cleff *C sol ut* on the third line. 9. *Viola quarta*, or fourth viol, is not known in England or France, though we frequently find it mentioned in the Italian compositions; the cleff on the fourth line. Lastly their *violetta*, or little viol, is in reality our triple viol, though strangers frequently confound the term with what has been said of the *viola prima*, *secunda*, *terza*, &c.

VIOL is also a term used among mariners

when an hawser, or strand rope, is bound fast with nippers to the cable, and brought to the jeer-capstan for the better weighing of the anchor when the main-capstan proves insufficient.

VIOLA, the **VIOLET**, in botany, a genus of the syngenesia-polygamia-monogamia class of plants, the corolla whereof is composed of five ringent irregular petals, and is corniculated behind: the fruit is a roundish, trigonal, obtuse capsule, formed of three valves, and containing three cells: the seeds are numerous, roundish, and appendiculated.

The officinal flowers of the violet have a very pleasant smell, and impart a deep purplish blue colour, denominated from them violet. They impart their colour and flavour to aqueous liquors. A syrup made from this infusion has long maintained a place in the shops, and proves an agreeable and useful laxative to children.

VIOLATION, the act of violating; that is, forcing a woman, or committing a rape upon her. See the article **RAPE**.

This term is also used in a moral sense for a breach or infringement of a law, ordinance, or the like; and it is also used for profanation. See **TRANSGRESSION**.

VIOLENT, in the schools, a thing done by force. In which sense it stands opposed to spontaneous. See the article **SPONTANEOUS**.

A thing is said to be violent when effected by some external principle, the body that undergoes it contributing nothing thereto, but struggling against it. The schoolmen allow, that man, as being endued with reason, is capable of suffering such violence, but brute and inanimate bodies are not.

VIOLET, *viola*, in botany. See **VIOLA**.

VIOLIN, or **FIDDLE**, a musical instrument mounted with four strings, or guts, and struck, or played, with a bow. The violin, like most other instruments, consists of three parts, the neck, the table, and the sound-board. At the sides are two apertures, and sometimes a third is added towards the top, shaped like an heart. Its bridge, which is below the apertures, bears up the strings which are fastened to the two extremes of the instrument, at one end of them to a screw, which stretches or loosens them at pleasure.

The style and sound of the viol is the gayest, most lively, and sprightly of all other instruments; and hence it is, of all others, the fittest for dancing: yet

there are ways of touching it which render it grave, soft and languishing, and fit for church or chamber music. It generally makes the treble or highest part in concerts. It is tuned by fifths: its play is composed of bass, counter-tenor, and treble: to which may be added a fifth part: each part has four fifths, which rise to a greater seventeenth. See the article **FIFTH**, &c.

In compositions of music the violin is denoted by V; two VV denote two violins. The word violin, alone, stands for treble violin. When the Italians prefix alto, tenore, or basso, it then expresses the counter-tenor, tenor, or bass violin. In compositions, where there are two, three or more different violins, they make use of primo, secundo, terzo, or of the characters I°, II°, III°, or 1°, 2°, 3°, &c. to denote the difference.

The violin has only four strings, each of a different thickness; the smallest whereof makes the *e si mi* of the high octave of the organ; the second, a fifth below the first, makes the *a mi la*; the third, a fifth below the second, is *d re*; lastly, the fourth, a fifth below the third, is *ge re sol*. Most nations ordinarily use the cliff *ge re sol* on the second line, to denote the music for the violin only. In France they use the same as the first line at bottom. The first of these methods is best where the song goes very low; the second, where it goes very high.

VIOLONCELLO of the Italians is properly our fifth violin; which is a little bass-violin, half the size of the common bass-violin, and its strings just half thick and half as long, which render the sound just an octave higher than the same. See the article **VIOLIN**.

VIOLONE, in music, a double bass, most twice as big as the common bass-violin, and the strings bigger and longer in proportion, and consequently its sound an octave lower than that of our bass-violin, which has a noble effect in great concerts. See **CONCERT** and **VIOLIN**.

VIPER, in zoology, a species of colub with the scuta of the abdomen an hundred and forty-five, and the squammæ of the tail, thirty-six. See **COLUBER**.

This is the most poisonous and mischievous in its bite of all the European serpents. It grows to near three feet in length, and to a considerable thickness in proportion. The principal ground-colour of the body is a dusky grey; all along

back there runs a broad brown line, which is dentated on each side; and on each side of this there is a kind of continued bluish line, formed of a series of spots of that colour, one of which is situated in the space formed by every denticulation in the back line: the belly is of a bluish black, very bright and glossy, resembling the colour of high polished, sanguined steel; and when closely examined, there is found a small dot of a deep black at the apex of every scale. The head is large and flattish: the throat is of a pale colour; and the mouth is large: the edge of the upper lip is whitish: the iris of the eye is of a flame colour; the pupil black; and there is a blue space, forming an acute angle, which separates the head from the longitudinal line on the back. The poison of this serpent is confined to its mouth: at the basis of the phangs, or long teeth, which it wounds with, is lodged a little bag containing the poisonous liquid, a very minute portion of which mixed immediately with the blood, proves fatal. Our viper-catchers are said to prevent the mischiefs otherwise following from the bite, by rubbing oil olive warm on the part. The flesh of the viper is perfectly innocent, and strongly recommended as a medicine of extraordinary service in scrophulous, leprous, and other chronical disorders: its virtues however in these cases, are probably too much exaggerated. The viper is undoubtedly a high nutritious food, and thence, in some kinds of weaknesses and emaciated habits, is not undeservedly looked on as a good restorative. To answer any valuable purposes, fresh vigorous vipers, not such as have been long kept alive after they are caught, should be liberally used as food. The wines and tinctures of them can scarce be supposed to receive any considerable virtue from the animal. The dry flesh brought us from abroad is entirely insignificant.

VIRAGO, a woman of extraordinary stature and courage; and who, with the female sex, has the mien and air of a man, and performs the actions and exercises of men.

VIRGA, a yard. See the article **YARD**.

VIRGA is particularly used in law for a verge, or rod, such as sheriffs and bailiffs carry as a badge of their office. See the article **VERGE**.

VIRGA AUREA, in botany, the same with **SOLIDAGO**. See the article **SOLIDAGO**.

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VIRGA SANGUINEA, in botany, the same with the cornus. See **CORNUS**.

VIRGÆ, in physiology, a meteor called also *columellæ* and *funes tentorii*; being an assemblage of several streams of light, representing a bundle of rods or ropes. It is supposed owing to the streaming of the sun's beams through certain rimulæ, or chinks, at least through the more lax and open parts of a watery cloud, happening chiefly in the morning and evening. There is also another kind, consisting not of streams of mere white light, but, as it were, painted of various colours like those of the rainbow.

VIRGIN, *virgo*, a female who has had no carnal commerce with man; or more properly, who has still the *flos virginis*, or maidenhead. In the antient christian church, there were a kind of religious order consisting of women who made open and public profession of virginity; and this before the monastic life or name was ever known in the world. This appears from the writings of Cyprian and Tertullian, who speaks of virgins dedicating themselves to Christ before there were any monasteries to receive them. These, for distinction's sake, were sometimes called ecclesiastical virgins and canonizæ, because they were enrolled in the canon or matricula of the church. They differed from the monastic virgins chiefly in this, that they lived privately in their fathers' houses, and in cases of necessity were maintained by the church; whereas the others lived in community and upon their own labour. Whether they made any solemn vow is not agreed on: and as to their consecration, it was usually performed publicly in the church by the bishop, or some presbyter deputed by him. See **MONK**, **NUN**, &c.

VIRGIN is also applied, by way of eminence, to Mary the mother of our Saviour, as conceiving and bringing him forth without any breach of her chastity. Many of the antient fathers, with the modern churches, hold, that the virgin not only conceived but brought forth, or was delivered, without breach of her virginity; and it is even alledged, that she remained a virgin to the end of her life: though, as this is not recorded in holy writ, many have denied it, and held that she had afterwards to do with Joseph, and bore other children.

Purification, &c. of the holy VIRGIN. See the article **PURIFICATION**.

VIRGIN is also applied figuratively to several

ral things that retain their absolute purity, and have never been made use of. Thus virgin-wax is that which has never been wrought, but remains as it came out of the hive. Virgin-oil is that which oozes spontaneously out of the olive, &c. without pressing. Virgin-gold, is that metal such as it is found pure in the mine, without any mixture of alloy; in which state it is sometimes so soft that it will take the impression of a seal. Virgin-copper is a native copper found in the mine, and which has never been melted down. Virgin-quicksilver is that found perfectly formed and fluid in the veins of mines; or at least such as is got from the mineral earth by mere lotion, without fire. Virgin-parchment is that made of the skin of an abortive lamb, &c. See the articles WAX, OIL, &c.

VIRGIN'S THREAD, a sort of meteor that flies in the air like small untwisted silk; which falling upon the ground, or upon plants, changes itself into a substance like a spider's-web. In these northern climates it is most frequent in summer, the days being then temperately warm, the earth not exceeding dry, nor yet overcharged with moisture. This has formerly passed for a sort of dew of an earthy slimy nature: but naturalists are now agreed that the virgin's threads are no other than so many spider's-webs. See the article SPIDER'S-WEB.

VIRGIN'S-BOWER, in botany, the same with clematis. See CLEMATIS.

VIRGIN ISLANDS, very small islands of the Caribees, situated in the Atlantic or American ocean, a little to the eastward of Porto-Rico.

VIRGINALE CLAUSTRUM, in anatomy, the same with hymen. See HYMEN.

VIRGINIA, one of the British American colonies, situated between seventy-four and eighty degrees west long, and between thirty-six and thirty-nine degrees of north lat. bounded by the river Patowmack, which separates it from Maryland, on the north; by the Atlantic Ocean, on the east; by Carolina on the south; and may be extended as far westward as we think fit.

VIRGINITY, *virginitas*, the test or criterion of a virgin, or that which intitles her to the denomination. The physicians, both antient and modern, are exceedingly divided upon the subject of virginity, some holding that there are no certain marks or testimonies thereof, and others, that there are. Moses established a test

that was to be conclusive among the Jews. The nuptial sheets, it seems, were to be viewed by the relations on both sides, and the maid's parents were to preserve them as a token of her virginity, to be produced in case her husband should ever reproach her on that score. In case the token of virginity was not found thereon, she was to be stoned to death at her father's door. This test of virginity has occasioned abundance of speculation about the parts concerned; but the nicest enquiries cannot settle any thing certain about them. Dr. Drake says expressly, that whatever might be expected among the Jews, there is not the same reason to expect those tokens of virginity in these countries; for, besides that the Hebrews married extremely young, as is the custom in all the eastern countries, there are several circumstances which may here frustrate such expectations, even in virgins not vitiated, either by any male contact, or any wantonness of their own. In effect, in these northern countries, the inclemency of the air exposes the sex to such checks of perspiration, as gives a great turn to the course of the humours, and drives so much humidity through the parts, as may extraordinarily supple and relax those membranes from which the resistance is expected, and from which, in hotter countries, it might more reasonably be depended on.

What most commonly passes among us for a test of virginity, is the hymen; and yet the most curious among the anatomists are greatly divided, not only about the figure, substance, place, and perforations of this membrane, but even about the existence thereof; some positively affirming, and others as flatly denying it. See the article HYMEN.

VIRGO, in astronomy, one of the signs or constellations of the zodiac, and the sixth according to order. See ZODIAC. It is marked thus ♍, and in Ptolemy's catalogue consists of 32 stars, in Tycho's of 39, and in the Britannic of 89.

VIRGULA DIVINA, or **BACULUS DIVINATORIUS**, &c. a forked branch, in the form of a Y, cut off an hazel-stick, by means whereof people have pretended to discover mines, springs, &c. under ground. The method of using it is thus: the person who bears it, walking very slowly over the places where he suspects mines or springs may be, the effluvia exhaling from the metals, or vapour from the water, impregnating the wood,

makes it dip or incline, which is the sign of a discovery. Some dispute the matter of fact, and deny it to be possible. Others, convinced by the great number of experiments alledged in its behalf, look out for the natural causes thereof: the corpuscles, say those authors, rising from the springs or minerals, entering the rod, determine it to bow down, in order to render it parallel to the vertical lines which the effluvia describe in their rise.

VIRGULTUM, in our antient law-books, is used for a holt or plantation of twigs or osiers.

VIRIDARIO ELIGENDO, a writ that lies for the choice of a verderor. See the article **VERDEROR**.

VIRILE, something that belongs or is peculiar to a man, or the male sex: thus the virile member is used for the penis; virile age, the strength and vigour of a man's age, *viz.* from thirty to forty-five years, being the age wherein we are equally removed from the extremes of youth and of old age.

VIRILIA, a man's genitals, or privy members, including the penis and testes. See the articles **PENIS** and **TESTES**.

VIRTSUNGIANUS DUCTUS, in anatomy, a canal usually called ductus pancreaticus. See the article **PANCREAS**.

VIRTUAL, or **POTENTIAL**, something that has a power or virtue of acting or doing. The term is chiefly understood of something that acts by a secret invisible cause, in opposition to actual and sensible.

VIRTUAL FOCUS, in optics. See **FOCUS**.

VIRTUALITY, in the schools, denotes some mode or analogy in an object, which, in reality, is the same with some other mode, but, out of regard to contradictory predicates, is considered as if distinct therefrom.

VIRTUALLY, in the schools, is applied to a mode of existence. A thing is said to be virtually any where, when it is deemed to be there by some virtue, influence, or other effect, produced by it: thus the sun is virtually on earth, *i. e.* by his light, heat, &c. A thing is also said to be virtually present, when the virtues or properties belonging to it, and issuing from it, remain: in which sense the forms of the elements are held to be virtually in mixed bodies. A thing is said to be a cause virtually, or a virtual cause, and that two ways; the first, when there is no real distinction between it, and the effect attributed to it, and yet it is

conceived by us as if it were really the cause thereof: thus immutability in God is the cause of eternity. Secondly, when an effect is not of the same kind with the cause, and yet the cause has the power or virtue of producing the effect: thus the sun is not formally but virtually hot; and the fire is not contained formally but virtually in heat.

VIRTUE, *virtus*, a term used in various significations. In the general it denotes power, or perfection of any thing, whether natural or supernatural, animate or inanimate, essential or accessory. But in its more proper or restrained sense, virtue signifies an habit, which improves and perfects the possessor and his actions. See the article **HABIT**, &c.

In this sense virtue is a principle of acting or doing well and readily, and that either infused from above, such as are the theological virtues; or acquired by our own application, as the intellectual or moral virtues.

For as there are two things in man, from which all his actions proceed, *viz.* the understanding and the will; so the virtue by which he is perfected, or whereby he is disposed to do all things rightly, and to live happily, must be twofold: the one of the understanding, and the other of the will. That which improves the understanding is called intellectual, or dia-noetic; and that, the will, moral and ethic; for since there are two things required, in order to live aright, *viz.* to know what should be done; and, when known, readily to perform it; and since man is apt to err various ways in each respect, unless regulated by discipline, &c. he alone can deport himself rightly in his whole course of life, whose understanding and will have attained their utmost perfection. See **UNDERSTANDING**, **WILL**, **ETHICS**, **MORALITY**, &c.

Intellectual virtue, then, according to Aristotle, is an habit of the reasonable soul, whereby it conceives or speaks the truth, either in affirming or denying. The virtues which come under this class are divided into speculative, which are those conversant about necessary things, that can only be known or contemplated; and practical, which are conversant about contingent things, that may likewise be practised. Aristotle has another division of intellectual virtues, fetched from the subject, as some of them are seated in the contemplative part, *viz.* those conversant about necessary things, as science, wis-

dom, intelligence; and others in the practical part, such are those conversant about contingent things, as prudence, art, &c. See the article SCIENCE, &c. Moral virtue is defined, by Aristotle, to be an elective habit, placed in a mediocrity, determined by reason, and as a prudent man would determine. Moralists usually distinguish four principal, or, as they are vulgarly called, cardinal virtues, *viz.* prudence, justice, fortitude, and temperance: the reason of which division is founded in this, that for a man to live virtuously and honestly, it is necessary he know what is fit to be done, which is the business of prudence: that he have a constant and firm will to do what he judges best; which will perfect the man, either as it restrains too violent perturbations, the office of temperance; or as it spurs and urges on those that are too slow and languid, which is the business of fortitude; or, lastly, comparatively with regard to human society, which is the object of justice. To these four virtues all the rest are referred, either as parts, or concomitants. See the articles PRUDENCE, JUSTICE, &c.

VIRTUES, in the celestial hierarchy, the third rank or choir of angels, being that in order between the dominations and powers: to these is attributed the power of working miracles, and of strengthening and reinforcing the inferior angels in the exercise of their functions.

VIRTUOSO, an italian term, lately introduced into english, signifying a man of curiosity and learning, or one who loves and promotes the arts and sciences: but among us the term seems to be appropriated to those who apply themselves to some curious and quaint, rather than immediately useful, art or study, as antiquaries, collectors of rarities of any kind, microscopical observers, &c.

VIRULENT, a term applied to any thing that yields a virus, that is, a contagious or malignant pus. For the virulent gonorrhœa, see the article GONORRHOEA.

VIS, a latin word, signifying force or power; adopted by physical writers to express divers kinds of natural powers or faculties. For the vis inertæ, see the article INERTIA, &c.

Vis impressa is defined, by Sir Isaac Newton, to be the action exercised on any body, to change its state, either in resisting or moving uniformly in a right line. This force consists altogether in the action, and has no place in the body, after

the action is ceased. See the articles PERCUSSION, MOTION, RESISTANCE, PRESSION, CENTRIPETAL, &c.

VISCAGO, in botany, the same with silene. See the article SILENE.

VISCERA, in anatomy, a term signifying the same with entrails, including the heart, liver, lungs, spleen, intestines, and other inward parts of the body. See the articles HEART, LIVER, &c.

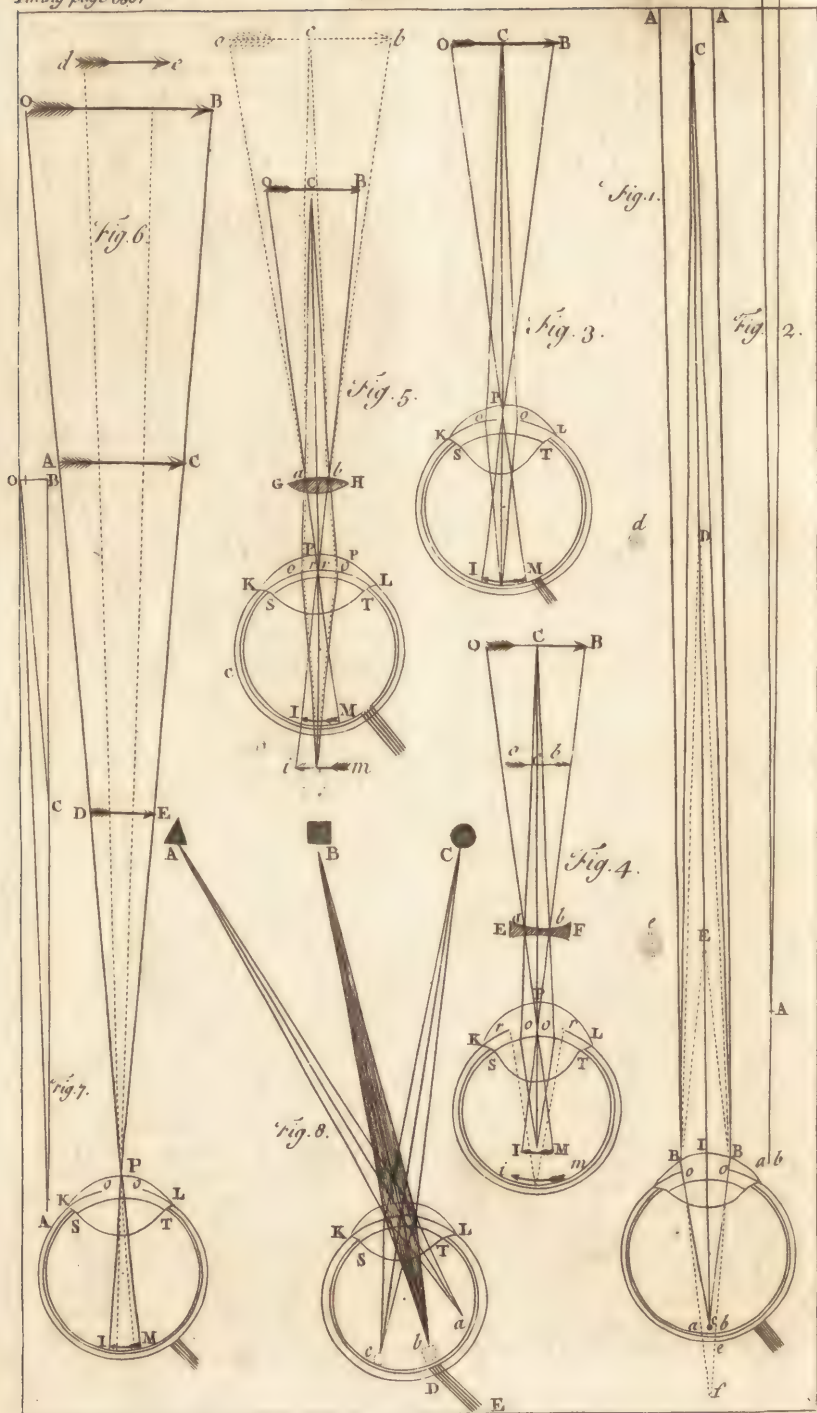
Wounds of the VISCERA. If any of the viscera situated in the abdomen, as the liver, spleen, or kidney, has received a wound from a sharp instrument, at the first dressing the wound must be filled as tenderly as possible with lint well saturated with highly rectified spirit of wine, or spirit of turpentine, securing the dressings with compresses and a bandage; by this means the hæmorrhage will be stopped, if no large vessel is divided. When this part is gained, the wound must be treated in the common manner, and the patient kept very low; bleeding him, if of a plethoric habit, and giving daily two or three doses of Locatellus's balsam; for balsams of this kind are of great service in healing internal wounds. This is the method to be taken with wounds of the viscera, which may be discovered by the eye or touch. But in such of them as are hidden, and not to be thus discovered, all that can be done is to inject vulnerary decoctions, and keep a passage open for the evacuation of fordes, or grumous blood. See the article WOUND, &c.

VISCIDITY, or VISCOSITY, the quality of something that is viscid or viscous, that is, glutinous and sticky, like birdlime, which the Latins call by the name *viscus*. Viscid bodies are those which consist of parts so implicated within each other, that they resist a long time a complete separation; and rather give way to the violence done them, by stretching or extending every way. The too great viscosity of foods has very ill effects; thus meats or farinæ not fermented, gel-lies, &c. of animals, tough cheese, or curds too much pressed, produce a weight or oppression in the stomach, wind, yawnings, crudities, obstructions of the minuter vessels in the intestines, &c. Hence an inactivity of the intestines themselves, a swelling of the abdomen; and hence a viscosity of the blood, from the re-union of the viscid particles; obstructions of the glands; paleness, coldness, tremors, &c.

VISCOUNT. See VICOUNT.

VIS-





VISCUM, MISLETOE, in botany, a genus of the dioecia-tetrandria class of plants, having no corolla; the fruit is a round smooth berry, containing one cell, wherein is a single carnosé seed, obtuse, compressed, and obversely cordated.

This plant was held in veneration by the superstition of former ages: it was hung about the neck, to prevent witchcraft; and taken internally to expel poisons. Of late times it has been celebrated as a specific in epilepsies, palsies, &c. virtues which it were greatly to be wished that experience gave any countenance to.

VISET, a town of the austrian Netherlands, in the province of Limburg, situated on the east shore of the river Maes, seven miles north of Liege.

VISIAPOUR, a city of the hither peninsula of India, in the province of Decan, situated one hundred and thirty miles north-east of Goa: east long. 75° , and north lat. $16^{\circ} 45'$.

VISIBLE, something that is an object of sight or vision, or something whereby the eye is affected, so as to produce a sensation. See the articles **VISION**, **SIGHT**, **EYE**, &c.

VISIER, or **VIZIER**, an officer or dignitary in the ottoman empire, whereof there are two kinds; the first, called by the Turks visier-azem, that is, grand visier, is the prime minister of state of the whole empire. He commands the army in chief, and presides in the divan or great council. Next to him are six other subordinate visiers, called visiers of the bench, who officiate as his counsellors, or assessors in the divan.

VISION, *visio*, in optics, the act of seeing or perceiving external objects, by means of the organ of sight, the eye. See the article **EYE**.

Such is the substance and form of the humours of the eye, when lodged in their proper receptacles, that rays of light, in passing through them, are affected in like manner as in passing through a convex lens; and therefore, to understand perfectly the nature of vision, we must first be acquainted with the doctrine of light and lenses. See **LIGHT** and **LENSES**. Now as the several pencils of rays flowing from the distinct points in the surface of an object placed before a lens, are collected into so many points at a certain distance, on the other side of the lens, and form an image there, when received upon white paper; so pencils of rays proceeding from an object placed before the

eye, at a proper distance from it, and being refracted in passing through the humours of it, are collected into their respective foci upon the retina, where they form a representation of that object; and by their impulses upon the tender nerves of the retina, an idea of the object is excited in the mind. See **REFRACTION**.

Vision is distinguished into bright and obscure, distinct and confused. It is said to be bright, when a sufficient number of rays enter the pupil at the same time; and obscure, when too few: it is called distinct, when each pencil of rays is collected into a focus, exactly upon the retina; and confused, when they meet before they come at it, or when they would pass it before they meet.

Now since parallel rays only have their focus upon, or meet in, the retina, they alone can paint there a distinct image of an object, or produce a distinct vision of it. If, therefore, the object be so near, that the rays from any particular point come diverging to the pupil, they will necessarily require a greater focal distance than the retina, or bottom of the eye; whence the rays not being united upon the retina, that point cannot be there distinctly represented, but will appear confused: thus, AB, AB (plate CCXCV. fig. 1.) are two parallel rays falling upon the pupil of the eye; and CB, CB, two other rays, which, though really diverging, yet, by reason of the remoteness of the point C, whence they proceed, will at the entrance of the eye be so nearly coincident with the parallel rays, as to have nearly the same focal point on the retina, so that the point C will there be distinctly represented by c. But if any other point E, be viewed very near the eye, so that the angles EBA, which they contain with the parallel rays, be very considerable, they will, after refraction, tend towards the point f, in the axis of the eye produced, and upon the retina will represent only a circular indistinct area; like that at e, whose breadth is equal to ab, the distance of the rays upon the retina. The same point at D, will not be quite so much dilated, as the rays DB, DB, have a less degree of divergence.

It is found by experience, that the nearest limit of distinct vision is about six inches from the eye; for if a book be held nearer to the eye than that, the letters and lines will immediately become confused and indistinct. Now this cause of indistinct

distinct vision may be in some measure remedied, by lessening the pupils, which we naturally do in looking at near objects, by contracting the annular fibres of the uvea; and artificially, by looking through a small hole made with a pin in a card, &c. for then a small print may be read much nearer than otherwise: the reason is plain, for the less the diameter of the aperture or pupil B B, the less will the rays diverge in coming from D or E, or the more nearly will they coincide with parallel rays.

Besides the contraction of the pupil, nature has furnished the eye with a faculty of adapting the conformation of the several parts to the respective positions of objects, as they are nigh or more remote; for this purpose, the cornea is of an elastic yielding substance, and the crystalline is inclosed with a little water in its capsula, that by the contraction and relaxation of the ciliary ligament, the convexity of both the surfaces of the capsula may be a little altered, and perhaps the position of the crystalline; by which means the distance from the retina may be fitted and adjusted to nigh objects, so as to have their images very distinctly formed upon the retina.

Nigh objects only have been mentioned (by which are meant such as are near the limit of distinct vision, as between six and a hundred inches distance) because objects more remote require scarce any change of the conformation of the eye; the focal distance in them varying so very little. Thus, suppose all the refraction of the eye were equivalent to that of a double and equally convex lens, whose radius $r=1$ inch: if then the object were 10 inches distant, or $d=10$, we

should have the focal distance $f=\frac{dr}{d-r}$
 $=\frac{10}{9}=0.11111$; and if another object be distant 100 inches, then $d=100$, and

$f=\frac{dr}{d-r}=\frac{100}{99}=0.10101$. The differ-

ence between these two focal distances is 0.0101, viz. the hundredth part of an inch, which the eye can easily provide against. If we go beyond this, suppose to an object 1000 inches distant, we have

$f=\frac{dr}{d-r}=0.1001001$, which is only

the thousandth part of an inch less than the former, and is therefore inconsiderable.

Now rays proceeding from any point

more than 6 inches distant from the eye, will, when they enter the pupil, be very nearly coincident with parallel rays; and therefore, to a sound eye, distinct vision cannot be effected at less than 6 or 8 inches distance, as may be found by any one who will make the experiment. Six inches, therefore, constitutes the limit of distinct vision, for near objects; we shall now consider the limit for remote objects; for objects may appear indistinct and confused, by being removed too far from the eye, as well as when they are too near it. And in this case we find objects will appear distinct so long as their parts are separate and distinct in the image formed on the retina; and those parts will be separate so long as the axis of the pencils of rays, which paint them, are separate at their incidence on the retina; that is, so long as the angle they contain is not less than one tenth of a degree: for it is found, by experience, that objects and their parts become indistinct, when the angle they subtend at the pupil of the eye is less than that quantity.

Thus, suppose OB (*ibid.* fig. 2.) to be a circle one tenth of an inch in diameter, it will appear distinct with its central spot, till you recede to the distance of 6 feet from it, and then it becomes confused; and if it be one fifth of an inch, it will begin to be confused at 12 feet distance, and so on: in which cases the angle subtended at the eye, viz. OAB, is about one tenth of a degree, or 6 minutes. And thus all objects, as they are bigger, appear distinct at a greater distance; a small print will become confused at a less distance than a larger; and in a map of England, the names of places in small letters become first indistinct, where those in capitals are very plain and legible; at a bigger distance these become confused, while the several counties appear well defined to a much greater distance: these also at last become so indistinct as not to be known one from another, when at the same time the whole island preserves its form very distinctly, to a very great distance; which may be so far increased, that it also, at last, will appear but a confused and unmeaning spot. We have seen the causes of indistinct vision in the objects, and shall now enquire what may produce the same in the eye itself. And first it is to be observed, that there is a proper degree of convexity in the cornea KPL (*ibid.* fig. 3.) and crystalline ST, for converging parallel rays to

to a focus on the bottom of the eye, in a sound state; hence every distant object OB , will have its image IM , accurately depicted on the retina, and by that means produce distinct vision.

But if the cornea KPL (*ibid.* fig. 4.) or crystalline ST , or both, should chance to be a little more convex than just, it will cause the pencil of rays oCo , which comes to the pupil oo , from any point C in the object OB , to unite in a focus before they arrive at the retina in the bottom of the eye; the image IM , of the object OB , will be formed in the body of the vitreous humour, and will therefore be very confused and indistinct on the retina at im . A person having such an eye, is called myops, in allusion to the eye of a mouse, by reason of its great convexity. To remedy this defect of the eye, a concave lens EF , is applied before it; for by this means the rays Ca , Cb , which fall diverging on the lens, will, after reflection through it, be made to proceed still more diverging, *viz.* in the directions ar , br (instead of ao , bo) as if they came from the point c , instead of C . Hence it follows, that since the rays are made to fall with greater divergence upon the eye, they will require a greater focal distance to be united in the axis; and, consequently, the focus may be made to fall very nicely on the retina, by using a lens EF , of a proper degree of concavity; so that distinct vision will be effected, in the same manner as in an eye of a just conformation.

Since the point c , is nearer to the eye than the point C , the apparent place of objects seen through a concave lens is nearer than the true place; or the object will appear at OB , instead of OB ; and also, since converging rays Oa , Bb , proceed less converging after refraction than before, the object appears under a less angle; and, therefore, the apparent magnitude of objects, seen by a concave lens, is less than the true: the object is also less luminous, or bright, seen thro' such a lens, than without it; because the rays being rendered more divergent, a less quantity enters the pupil of the eye, than otherwise would do: for the picture is always more or less bright, according as it is made by a greater or less quantity of rays. Lastly, it appears from what has been said, that when a concave lens EF , cannot be applied, we may still effect distinct vision, by lessening the distance between the object and the eye:

for it is plain, if OB be situated at OB , the image at IM , will recede to im , upon the retina, and be distinct, in the same manner as when made so by the lens EF .

On the other hand, when the cornea or crystalline is too flat, &c. (as often happens by age) an object OB (*ib.* fig. 5.) placed at the same distance from the eye PC , as before, will have the rays Co ; Co , after refraction in the eye, proceed to a focus beyond the bottom of the eye, in which, if a hole were made (in an eye taken out of the head) the rays would actually go on, and form the image im ; which image must, therefore, be very confused and indistinct on the retina. To remedy this defect, a convex lens GH , is applied, which causes the diverging rays Ca , Cb , to fall less diverging upon the eye, or as if they came from a point more remote, as c ; by which means the focal distance is shortened, and the image duly formed on the retina at IM , by which distinct vision is produced.

Hence the apparent place of the object at c , is more distant than the true place is at C ; and its apparent magnitude OB is greater than the true, because the converging rays Oa , Bb , are by this lens after refraction made to unite sooner than before, and so to contain an angle OPB greater than the true OPB . The object appears through a convex lens brighter than without, because by this means a greater quantity of rays enter the pupil; for the rays ao , bo , are by the lens made to enter in the directions ar , br , which are nearer together, and leave room for more to enter the pupil all around between o and r .

As the image of the object painted on the retina is greater or less, so will the apparent magnitude of the object be likewise; or, in other words, the angle IPM (*ibid.* fig. 6.) subtended by the image is always equal to the angle OPB subtended by the object at the eye, and therefore the image IM will be always proportional to the object OB . Hence it follows, that the angle OPB under which an object appears, is the measure of its apparent magnitude.

Therefore objects of different magnitudes, as OB , AC , DE , which subtend the same angle at the eye, have the same apparent magnitude, or form an equal image in the bottom of the eye. Hence it is that objects at a great distance have their magnitude diminished proportion-

portionally : thus the object DE removed to DE appears under a less angle DPE; and makes a less image on the retina, as is shewn by the dotted lines.

The angles of apparent magnitude OAB, OCB, (*ibid.* fig. 7.) when very small, are as their sines, and therefore as the sides OC and OA, or BC and BA; that is, the apparent magnitude of the object OB, at the distances BC and BA, is inversely as those distances; or its magnitude at C is to that at A as AB to CB.

The more directly any object is situated before the eye, the more distinctly it will appear; because those rays only which fall upon the eye near its axis can be convened to a point in the bottom of the eye on the retina, and therefore that part of the image only which is formed by the direct pencil of rays can be clear and distinct; and we are said to see an object by such a pencil of rays, but only to look at it by the others which are oblique. Suppose A, B, C, (*ibid.* fig. 8.) represent three pieces of paper stuck up against the wainscot of a room at the height of the eye; if then a person places himself so before them, and shutting his right eye views them with his left, it is very remarkable that the paper B, whose pencil of rays falls upon the insertion D of the optic nerve DE, will immediately vanish or disappear, while the two extreme papers C and A are visible; and by altering the position of the eye, and its distance, any of the papers may be made to vanish, by causing the pencil of rays to fall on the point D. Why the rays of light should not excite the sensation of vision in the point D, where the fibres of the nerves begin to separate and expand every way to form the retina, is not easy to say. But it is worth notice, that the nerve DE is for that reason placed on one side of the eye, where only the oblique rays come, the loss of which is not considerable, and no way affects or hinders the perfection of sight: whereas had it entered in the middle of the bottom of the eye, it had rendered useless all the direct rays, by which the most perfect and distinct vision is effected; and we could have had only a confused and imperfect conception of objects, by oblique collateral rays.

The laws of vision, brought under mathematical demonstration, make the subject of optics, taken in the greatest latitude of the word; which is commonly

used, in a more restrained sense, for the doctrine of direct or simple vision, performed by rays passing directly, or in a straight line, from the object to the eye. The doctrine of reflected vision, or that performed by means of rays reflected from mirrors, makes the subject of catoptrics; and refracted vision, or that performed by rays refracted through glass lenses, or other mediums, constitutes that branch of optics, called dioptrics. See the articles OPTICS, DIOPTRICS, CATOPTRICS, LENS, MIRROR, REFLECTION, and REFRACTION.

VISION, among divines, an appearance which God occasionally sent his prophets and saints, either by way of dream, or reality: such were the visions of Ezekiel, Amos, St. Paul, &c.

Beatific VISION, denotes the act whereby the angels and blessed spirits see God in Paradise.

VISITATION, in law, an act of jurisdiction, whereby a superior, or proper officer, visits some corporation, college, church, or other public or private house, to see that the laws and regulations thereof be duly observed.

Among us, visitation is that office performed by the bishop in every diocese once in three years, or by the archdeacon every year, by visiting the churches and their rectors throughout the whole diocese, &c. The bishop's commissary also holds a court of visitation, to which he may cite all church-wardens and side-men; and to whom he exhibits his articles, and makes inquiry by them.

VISMATHUM, BISMUTH, in natural history. See the article BISMUTH.

VISNE, *visnetum*, in law-books, signifies a neighbouring place, or place near at hand.

VISTULA, or WEISEL, a large river of Poland, which, taking its rise in the mountains south of Silesia, visits Cracow, Warsaw, &c. and continuing its course north, falls into the Baltic Sea below Dantzick.

VISUAL, in general, something belonging to vision. See the article VISION.

Thus, rays of light, coming from an object to the eye, are called visual rays; and the visual point in perspective is a point in the horizontal line, wherein all the visual rays unite. See the articles RAY and PERSPECTIVE.

VITAL, in physiology, an appellation given to whatever ministers principally to the constituting or maintaining of life

life in the bodies of animals: thus, the heart, lungs, and brain are called vital parts; and those operations of these parts, whereby the life of animals is maintained, are called vital functions. See the article **FUNCTION**.

VITERBO, a city of Italy, twenty-five miles north of Rome.

VITEX, the **CHASTE-TREE**, in botany, a genus of the didymia-angiospermia class of plants, with a monopetalous, ringent, and bilabiated flower, each lip of which is trifid: the fruit is a quadrilocular, globose berry; containing four seeds. See the article **AGNUS CASTUS**.

VITIS, the **VINE**, in botany, &c. See the article **VINE**.

VITIS IDÆA, in botany, a species of vaccinium. See the article **VACCINIUM**.

VITREOUS humour of the eye, is so called from its resemblance to glass in fusion, being very like a fine clear jelly in appearance: it probably, says Heister, consists of extremely fine vesicles, containing a limpid and perfectly pellucid humour. It fills the posterior part of the eye, and is every where contiguous to the hinder part of the retina, which it serves also to expand. See **EYE**.

VITRIFICATION, in chemistry, is the converting a body into glass, by means of fire. See the article **GLASS**.

Of all bodies, fern-ashes, sand, pebbles, &c. vitrify the most readily; and accordingly, it is of these that glass is principally made.

VITRIOL, in natural history, a compound body formed of the particles of metals dissolved by the acid of sulphur, and that either by the operations of nature, without the earth, or in the chemists laboratory by proper admixtures and assistances, and afterwards, by the help of water, brought into the form of a salt.

The vitriols, therefore, very much approach the nature of metals, and, in some instances, are found to have taken up other substances, particularly, some of the semi-metals among them, as, the white-vitriol, which contains zink. See the article **ZINK**.

The other metals we find dissolved in this manner in the bowels of the earth, and there formed into vitriols, are iron and copper. These, therefore, are the great basis of those salts; and according as they belong to one or the other of them, are to be divided into the cupreous and the ferrugineous vitriols.

The naturalist, who collects for his

amusement, will meet with vitriols containing these two metals, in various proportions, in the same mass. The blue-green vitriol of Hungary and Transylvania, and many other of the fossils of this class are of that kind.

We shall here only consider those vitriols fit for the use of medicine, and, therefore, treat of the distinct and determinate vitriols which contain only the particles of one of these metals. Of these there are but three kinds, *viz.* 1. Green vitriol. 2. White vitriol. 3. Blue vitriol. To these, however, we are to subjoin the vitriolic minerals, misy, sory, melantina, &c. which are all of them, properly, the ores of vitriols. See **MISY**, **SORY**, &c.

1. Green vitriol has iron wholly for its basis. It is formed solely of that metal, dissolved by the acid of sulphur, and by means of water reduced to the form of salt. It is of two kinds, natural and factitious; the natural or native kind is known by the name of green vitriol; the common appellation of the other is copperas. See the article **COPPERAS**.

It is a tolerable pure and pellucid salt, of a compact and regular texture, considerably heavy; but friable, and easily shattering to pieces on the smallest blow. It is of a fine, pale, grass-green colour. It will not melt, or wholly run to water in a damp air, but it is very apt to be moist on the surface; it very readily dissolves in water, and after evaporation, freely shoots again into regular crystals, the true figure of which is a thick rhomboid; but they are seldom perfect or regular. Exposed to the fire, it becomes thin like water, boiling and bubbling up, and emitting a very thick fume. After this it grows thicker, and, finally, calcines to a grey powder; and from this, if the fire be continued and made more violent, to a fine purple matter, called colcothar of vitriol. See **COLCOTHAR**.

In England, where the greatest quantity of this vitriol is made, it is formed from the common greenish pyrites, with the addition of old iron. The people who collect these pyrites, are not at the pains of searching it among the strata, but they pick it up on the sea coasts of Essex, and other places, under cliffs, composed of strata of clay, out of which the sea washes it, and leaves it on the shore. This pyrites they expose to the air in vast heaps, and, in consequence of that, it by degrees begins to swell and burst, and shoot out in salts. They pile up these heaps in a kind of

pits lined with clay, now and then turning them when their salt begins to appear in a downy efflorescence on the surfaces of the pieces they fall into, on breaking; the time of making vitriol being near. These efflorescences dissolve by the rains and dews, and are, in fine, converted into an acrid liquor, which is conveyed from the bottom of the pits into leaden boilers, into which a quantity of old iron is also thrown; the fire is made under these, and the liquor is kept boiling for three days, or more, and is all the time supplied with fresh parcels of iron, so long as it will act upon them. The old iron, picked up by the poor people about our streets, is sold to the vitriol or copperas makers with this intent. When the liquor is boiled to a proper consistence, it is let out into large coolers, in which there are sticks placed across, to which, as well as to the sides of the vessel, the vitriol adheres in large crystals, of the form and texture above described.

This salt, on a chemical analysis, affords a very strong acid spirit; or, as it is usually, though very improperly, called, oil, which is a solvent for many of the metals, and effervesces very violently with an alkali, and even with spirit of wine, or common water. Mixed with sal armoniac, it ferments violently, but the fermentation is attended with great coldness, instead of the heat usual on these occasions; and what is very singular is, that, while the fermenting mixture itself is thus cold, the vapour that arises from it is evidently hot to the hand. After the distillation of this acid liquor of vitriol, what remains in the retort is a red earth called colcothar; it contains iron, and is a strong astringent. See the article **ALKALI**.

In medicine, this spirit is given internally in fevers, and hæmorrhages, and particularly in malignant fevers of the petechial kind; to be taken in all the drink, in such quantity as to give an agreeable acidity to it.

Vitriolated tartar is another very valuable medicine, prepared from green vitriols, which attenuates the humours, resists putrefaction, and opens obstructions of the viscera. See the article **TARTAR**.

2. White vitriol is a true and genuine, though not a pure, vitriol of iron; the colour of which, that has so long perplexed the world to account for, is at

length found to be owing to a mixture of zink in it.

The white vitriol, used in the shops, is all prepared from the native salt of the same name and colour, by solution and evaporation. It is a safe, gentle, and expeditious vomit; being given in solution, from ten grains to a scruple, or more: it is also used externally in collyriums, intended against inflammations of the eyes; and is a very powerful styptic in injections to stop the gleet that sometimes remains after the cure of a gonorrhœa. See **GONORRHOEA**.

3. Blue vitriol is a vitriol which has copper for its basis. It is only met with suspended in the waters of certain springs, from which it is obtained by means of evaporation and crystallization. The water of such springs as are found strongly enough impregnated with copper to be worth the working for vitriol, is saved in reservoirs, and evaporated to a proper standard; after which it is let out into coolers, where it shoots into the beautiful crystals we see; which have the same qualities with the water, and on solution in common water, they make a ziment-water, not to be distinguished from the native kind.

Blue vitriol is not given internally; but is of great use in external applications. The blue vitriolic water of the shops is made by dissolving three ounces of blue vitriol, and two ounces of alum, in a pint and a half of boiling water; afterwards add two ounces of strong spirit of oil of vitriol filtering the whole for use. It is an excellent styptic, and particularly serviceable in hæmorrhages of the nose. See the article **HÆMORRHAGE**.

VITRIOLATED, among chemists, something that has vitriol infused in it.

VITRIOLIC, an appellation given to whatever abounds with, or partakes of, the nature of vitriol: thus such fossil bodies as contain vitriol, are called vitriolic minerals, or ores of vitriol; as the pyrites, chalcitis, misy, sory, melantheria, marcasites, &c. See the articles **PYRITES**, **CHALCITIS**, &c.

VITRIOUS, or **VITREOUS** *humour of the eye*. See the article **VITREOUS**.

VITRY, a town of Champaign, in France, forty-six miles south-east of Rheims.

VITTA, in anatomy, that part of the amnios, which sticks to an infant's head, when just born. See **AMNIOS**.

VITUS'S DANCE, *chorea sancti viti*, in medi-

medicine, a sort of convulsion, which boys and girls are subject to, from the age of ten years, to the time of puberty : it discovers itself first by a kind of lameness, or an instability of one of the legs, which they draw after them in a ridiculous manner ; nor can they hold the arm of the same side still for a moment ; and before they can bring a cup to their mouth, they use a thousand odd gesticulations. In a convulsive paroxysm, the limbs are strongly agitated ; the hands are sometimes put behind them, and soon after they seem to be beating the air ; and their legs will be drawn hither and thither, as if they were dancing some antic dance. See the articles CONVULSION and SPASM.

Dr. Mead thinks this disorder to be rather paralytic than convulsive, and that it may be cured by the use of cold baths, and chalybeate medicines. Sydenham's method of cure is this : first, take off seven or eight ounces of blood, more or less, according to the strength of the patient, from the arm ; and the next day, let the patient take a gentle purge of rhubarb, sena, manna, &c. In the evening of the same day, let him take a draught, with a scruple of venice-treacle, and eight drops of liquid laudanum mixed in honey and milk-water. This purging and opiate draught is to be repeated at some days distance ; the bleeding is also to be repeated to the fourth time ; and in the intermediate days, a cordial and nervous electuary is to be given, composed of the conserves of rosemary, orange-peel, and roman wormwood, with venice-treacle, candied nutmeg, and candied ginger ; of this, the bigness of a nutmeg may be given every morning and afternoon, drinking after it a decoction of piony, masterwort, and elecampane, and angelica-roots, the leaves of rue, sage, betony, and other cephalic plants, with orange peel, and juniper-berries. Spirit of harts-horn may also be given every night in small doses, in a nervous julep, and plasters of gum-caranna may be applied to the soles of the feet. According as the cure advances, the patient recovers the use of his hand and foot ; and his amendment may always be discovered by letting him attempt to bring a glass of any liquor to his mouth in a strait line : tho' the bleeding should not be repeated beyond the fourth time, yet the alterative and purging medicines should be continued till the patient is quite well ; and as

people are subject to relapses in this disorder, it is proper to give the same medicines, and to bleed at the return of that season of the year.

VIVA VOCE, a latin phrase frequently used in english writers, and literally signifying, by word of mouth.

VIVARY, in law books, a term indifferently used for a park, warren, or fishpond. See the article **PARK**, &c.

VIVERRA, the **FERRET**, in zoology. See the article **FERRET**.

VIVIERS, a city of Languedoc, in France, situated on the river Rhone, twenty miles north of Orange.

VIVIFICATION, in medicine, the art of vivifying ; that is, of contributing to the action that gives life, or maintains life. The chemists, also, use the word in speaking of the new force, vigour, and lustre, which, by this art, they give to natural bodies ; particularly to mercury, which, after having been fixed or amalgamated, they restore to its first state.

VIVIPAROUS, *viviparus*, in natural history, an epithet applied to such animals as bring forth their young alive and perfect, in contradistinction to them that lay eggs, which are called oviparous animals. See the article **GENERATION**.

The females of all the quadruped class are viviparous, and those of the bird-class are all oviparous. The laws of nature in the larger animals, are therefore, in a great measure, fixed and certain ; but it is not so in the insect tribes, nor in the fishes ; for of these some are viviparous, and others oviparous ; and those of genera nearly allied to one another. Among insects, the much greater number are oviparous ; but there are many which are not so, as the pucerons, progallinsects, cochineal, &c. The millepedes and scorpions are also well known to be so ; all the females of the butterfly, and of some other classes, lay only eggs : but the most singular and remarkable inconsistency in nature, if we may be allowed the expression, is that in the fly-kingdom ; the same class of insects, and even the same genus, will furnish us with some which are viviparous, and others which are oviparous ; the two-winged flies give us instances of this ; but these are not single in that respect ; for among the reptile world, there are other creatures which are subject to the same varieties ; and Swammerdam has observed a viviparous snail. The two-winged viviparous flies bring forth worms

in all respects the same with those hatched from their eggs in the other species.

VIVO, in architecture, the shaft or fust of a column. See the article **COLUMN**.

The term is also used in a more particular sense for the naked of a column, or other part.

VIZIER, or **VISIER**. See **VISIER**.

UKRAIN, a province of Muscovy, lying northwards of Little Tartary, so called as being a frontier against Turkey.

ULADISLAW, a city of Great Poland, situated on the river Boristhenes, eighty miles north west of Warsaw: east long. 19°, and north lat. 53°.

ULCER, *ulcus*, in surgery, is a solution of the soft parts of our bodies, together with the skin, produced by some internal cause, as an inflammation, abscess, or acrimonious humours. But wounds which become inveterate, and even contusions, when difficult of cure, come within this definition, and pass, at length, into ulcers, and are commonly so called. See **ABSCESS**, **WOUND**, &c.

The proper and usual seat of an ulcer, then, is in any of the softer parts of the body, as the skin, fat, glands, flesh, and internal viscera. For if there be any exulceration or corrosion in the harder parts, as the bones, it comes rather under the notion of a caries, or what is commonly called *spina ventosa*, than that of an ulcer; though, on account of some kind of resemblance which it has with the ulcer, or erosion, of the softer parts, they are sometimes treated of in conjunction. See the article **CARIES**, &c.

Ulcers can by no means be reckoned all of one kind, but are distinguished into various species, on many accounts; as, 1. with respect to the different parts of the body in which they are seated; for, sometimes, they infect the skin, at other times the fat, and sometimes the glands and flesh. 2. As to their magnitude; for some ulcers are large and extended, others small, and contracted within narrow limits; some deep, others shallow and more superficial; in particular, ulcers of a considerable depth, but narrower, and more especially distinguished by the narrowness of their orifice or beginning, usually pass under the peculiar denomination *sinus* or *fistula*. Ulcers differ, 3. With regard to duration; for some are recent, others inveterate. 4. On account of their attendant symptoms; in which respect some ulcers are mild and favourable, others malignant, that is,

attended with very acute pains, or foetid, putrid, pinguious, rheumy, or discharging much ichor, creeping or spreading, cancerous, or inclining to a cancer, callosous, fistulous, or verminous; there is a difference between them. 5. With respect to their causes, in which light they assume the epithets of scorbutic, venereal, carious, cancerous, pestilential, and such as are supposed to proceed from fascination. In the last place, ulcers are distinguished by the parts in which they are seated. Thus, some infect the nostrils, others, the fauces, palate, breasts, and anus; and one sort has the name of *fistula lacrymalis*. See the articles **SINUS**, **FISTULA**, &c.

The method of cure in ulcers is extremely various, as adapted to the great variety of the disease; for when the ulcer is but recent, it is to be healed in the same manner as a recent wound or abscess. We must first, then, begin with mundification, or cleansing the ulcer; after that proceed to incarnate, or fill the cavity with new flesh; and, lastly, cover and conglutinate the same as much as possible, with a fair and even cicatrix.

Mundification of an ulcer is, according to Heister, usually performed in the following manner: first, the corrupted matter is evacuated; or, when it discharges itself not so freely as it ought, gently expressed with the fingers; if there be a deep sinus belonging to the ulcer, it is to be extirgated by some proper injections; or, if the place be open enough, by repeating intromissions of fresh lint. If there be any pieces of membranes, or other corrupted pinguious parts, left in the ulcer, the best way to eject them is, at every dressing, to introduce into the place lint moistened with some digestive ointment, and cover it with a plaster of diachylon, diapalma, or something of the like nature; and upon that, apply compresses, and over the whole a bandage; this method is to be carefully followed till the place be thoroughly cleansed, or till the bottom of the ulcer appears quite red, and covered with new flesh.

After due mundification, the next business is to fill the ulcer with new flesh, which is performed by the help of such medicines as are commonly called *sarcotics*. The best and most effectual, by many degrees, is the digestive ointment; for without some extraordinary impediment, this digestive is, of itself, sufficient to produce new flesh. It is, indeed,

the manner of almost all surgeons very gravely to recommend every one his proper balsamics for the procuring of new flesh; but it is presumed, there is no necessity for them to be so careful and solicitous in this point, since there is, in this very digestive, a balsamic virtue; and it ought, besides, to be considered, that this new flesh owes its generation, not so much to the assistance of medicines, as the benefit of nature: for all the care and diligence of the surgeon have scarce any other effect, than to remove all such things as are hurtful, and may prove impediments to a cure. If any one, however, should think this digestive ointment not strong enough for his purpose, he may try balsam of arcaeus, balsam of Peru, balsam of Mecca, balsam of sulphur, essence of myrrh and aloe, oil of myrrh per deliquium, oil of eggs, and other vulnerary balsams of the like kind, which may be used in its stead; and, by the best means he can procure, to accomplish a perfect conglutination.

When an ulcer has penetrated so deep as to have its bottom remote, not only from sight, but from the reach of medicines, it may seem necessary in every dressing, after expressing the corrupted matter collected within, to make an injection of some cleansing and healing liquor; such as a decoction of agrimony and birthwort mixed with honey of roses, or essence of myrrh and aloe, or what Bellosse, in his Hospital-surgeon, recommends, a decoction of walnut-leaves mixed with sugar before the place be bound up, till the bottom is conglutinated, and to continue the same till the ulcer is filled up. See VULNERARY, &c. The ulcer being, by some means or other, as may seem most adviseable, incarnated and filled up, the induction of a fit and decent cicatrix must be completed; but if by such means you cannot prevent a luxuriancy of flesh, with a moistness of the ulcer, it will be proper to sprinkle on the part some drying powders, such as those of mastic, frankincense, sarcocolla, colophony, lapis calaminaris, and tully; applying, afterwards, to the place dry lint, and a plaster accommodated to retain and hold together all the things applied, continuing the same till the place be perfectly whole and sound: but if the luxuriant and fungous flesh has already elevated itself above the rest, above the skin, the best way to consume it, is to rub it with blue vitriol; or, if this be not

strong enough, to sprinkle on it some powder of red precipitate and burnt alum, till its growth be entirely suppressed, and nothing appears prominent. See the articles FUNGUS and CICATRIX.

In the last place, it is hardly to be expressed how much a prudent regimen in diet and manner of living contributes towards the incarning and conglutination of ulcers: for it has been an old observation of the professors of the salutary art, that very bad ulcers have been cured by means of a regimen, without any considerable assistance from medicine; and, on the contrary, that the slightest and most contemptible sores have, by a neglect of the rules of diet, and prosterous way of living, degenerated into very bad, and even incurable, ulcers. See the article REGIMEN.

Great care, therefore, is to be taken by every person troubled with an ulcer, to avoid salt, acrid, and acid food, and such as is too fat or heating, with swine's flesh, and all such as is difficult of concoction. If a bad habit of body be an impediment to the cure of an ulcer, the advice of a skilful physician is required, who, by the prescription of proper internal medicines, may not only prevent an ulcer of a mild and favourable kind from becoming malignant, and perhaps incurable, but as much as possible promote and hasten its cure. See the article DIET.

In callous and fistulous ulcers, that have formed variety of sinuses, and when either nothing can be done by corrosive medicines, or else that they tear and corrode the nerves, and bring on convulsions, and other bad symptoms, before they affect the callus; in these cases, the best and safest way is to lay open the sinus, taking care not to wound the nerves, tendons, and arteries; and, after that, all the calluses may be easily destroyed by the common methods. Or, if even this method should not have the desired effect, and if the patient has a considerable share both of strength and courage, and the situation of the nerves and arteries is favourable, the callous parts must be all either entirely cut out with the knife, or burned away by the actual cautery. See the article CALLUS. When ulcers are attended with a large discharge, the acrimonious serum, where-with the blood abounds, should be evacuated by cathartic and diuretic medicines. Millepedes, in any form, are very pro-

properly prescribed to be taken internally in these, as are also the essence of amber, myrrh, balsam of Peru, tincture of salt of tartar, tartarized tincture of antimony, and the like: large and frequent draughts of small liquors are frequently the cause of these disorders, and are therefore most carefully to be avoided; strong ale, or old wine, should be drank sparingly at meals, and nothing between them. Such meats are best, on these occasions, as have fewest juices in them, and are very well roasted; and the external medicines must be those which have the greatest reputation as dryers. The principal of these are lime-water, lapis calaminaris, tutty, chalk, mastic, frankincense, colophony, and native cinabar; and when any of these have been sprinkled in fine powder upon the ulcer, a plaster of diapompholygos, or the like, is to be laid over it.

For the cleansing venereal ulcers, Heister recommends the phagedenic water; or lime-water, impregnated with calomel: either of these may be applied often every day, and the parts may also, if necessary, be touched with the caustic; and when they are thoroughly cleansed, they may very successfully be healed, either with an ointment made only of crude mercury mixed with turpentine, or with the following: take of the diapompholygos-ointment and crude mercury, killed with a small quantity of Venice-turpentine, of each equal quantities; mix them in a glass-mortar into an ointment: or, take of the amalgama of lead and tin an ounce, of bole armenic two ounces; mix these, and make them into an ointment, by mixing with them a sufficient quantity of ointment of roses, or any other simple ointment, in a glass-mortar. If there be at the same time a caries of the bone, which is, indeed, too frequently the case, this is to be dressed with euphorbium, oil of cloves, phagedenic-water, or spirit of nitre with quick-silver dissolved in it; or, if it can conveniently and safely be done, the actual cautery is of signal service. See POX, BUBO, &c.

ULCERATION, or **EXULCERATION**, in surgery, a little hole in the skin, caused by an ulcer. See the preceding article.

ULEX, in botany, a genus of the diadelpho-decandria class of plants, with a papilionaceous flower; and an oblong turgid pod for its fruit, containing a few roundish and emarginated seeds.

This genus comprehends the genista

spinosa, or furze-bush, and the genista spartium of authors.

ULIERBECK, a town of Brabant, eleven miles south-east of Mechlin.

ULIGINOUS, in agriculture, an appellation given to a moist, moorish, and fenny soil.

ULLAGE, in gauging, is so much of a cask, or other vessel, as it wants of being full. See the article GAUGING.

The ullage of a vessel, whose axis is parallel to the horizon, may be found thus: let AGBH (pl. CCXCVI. fig. 1. n° 1.) be the great circle in the middle of the cask, whose segment GBH is filled with liquor, the segment GAH being empty. The segment GBH is known, if the depth EB be known, and EH a mean proportional between the segments of the diameter AE and EB; all which are found by a rod or ruler put into the vessel. Let the basis of the cask, at a medium, be found; which suppose to be the circle CKDL (*ibid.* n° 2.) and let the segment KCL be similar to the segment GAH (which is either found by the rule of three, because the circle AGBH: the circle CKDL:: the segment GAH: the segment KCL; or it may be found by the tables of segments made by authors) and the product of this segment, multiplied by the length of the cask, will give the liquid content in the cask; which being subtracted from the whole content, leaves the ullage AGH.

ULM, an imperial city of Swabia, in Germany, ninety miles south-west of Ratibon: east long. 10°, north lat. 48° 24'.

ULMARIA, in botany, a species of filipendula. See FILIPENDULA.

ULMEN, a town of Germany, thirty miles north-east of Triers.

ULMUS, the **ELM**, in botany, a genus of the pentandria digynia class of plants, without any corolla: the fruit is a large oval drupe, containing a single, roundish, and slightly compressed seed. See **ELM**.

ULNA, in anatomy, one of the bones of the fore-arm, reaching from the elbow to the wrist: it is big at its upper extremity, and grows gradually smaller towards its lower end. See **SKELETON**.

This bone is longer than the radius, and has a motion of flexion and extension: at its upper extremity, it articulates with the os humeri and the crista of the radius; and its lower extremity articulates with the carpus, as also with the radius by means of a cista.

ULNA, an ell. See **ELL** and **MEASURE**.

UL-

Fig. 1. ULLAGE.

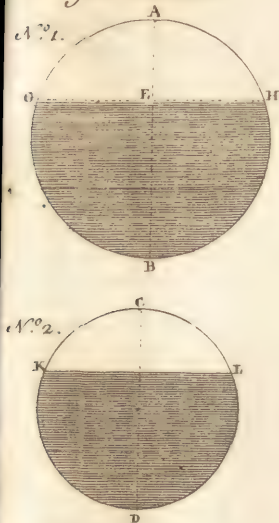


Fig. 2. Operation for the UNGUIS.

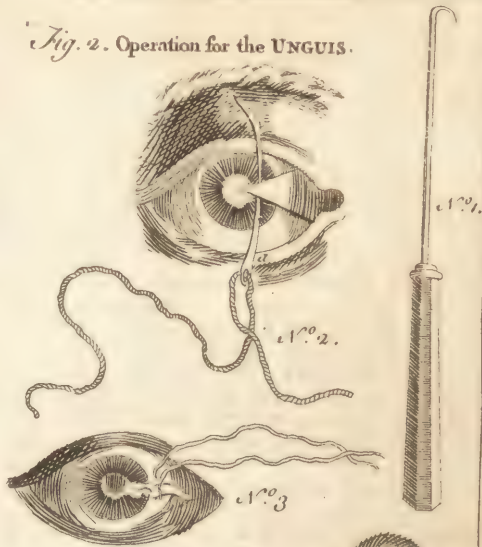


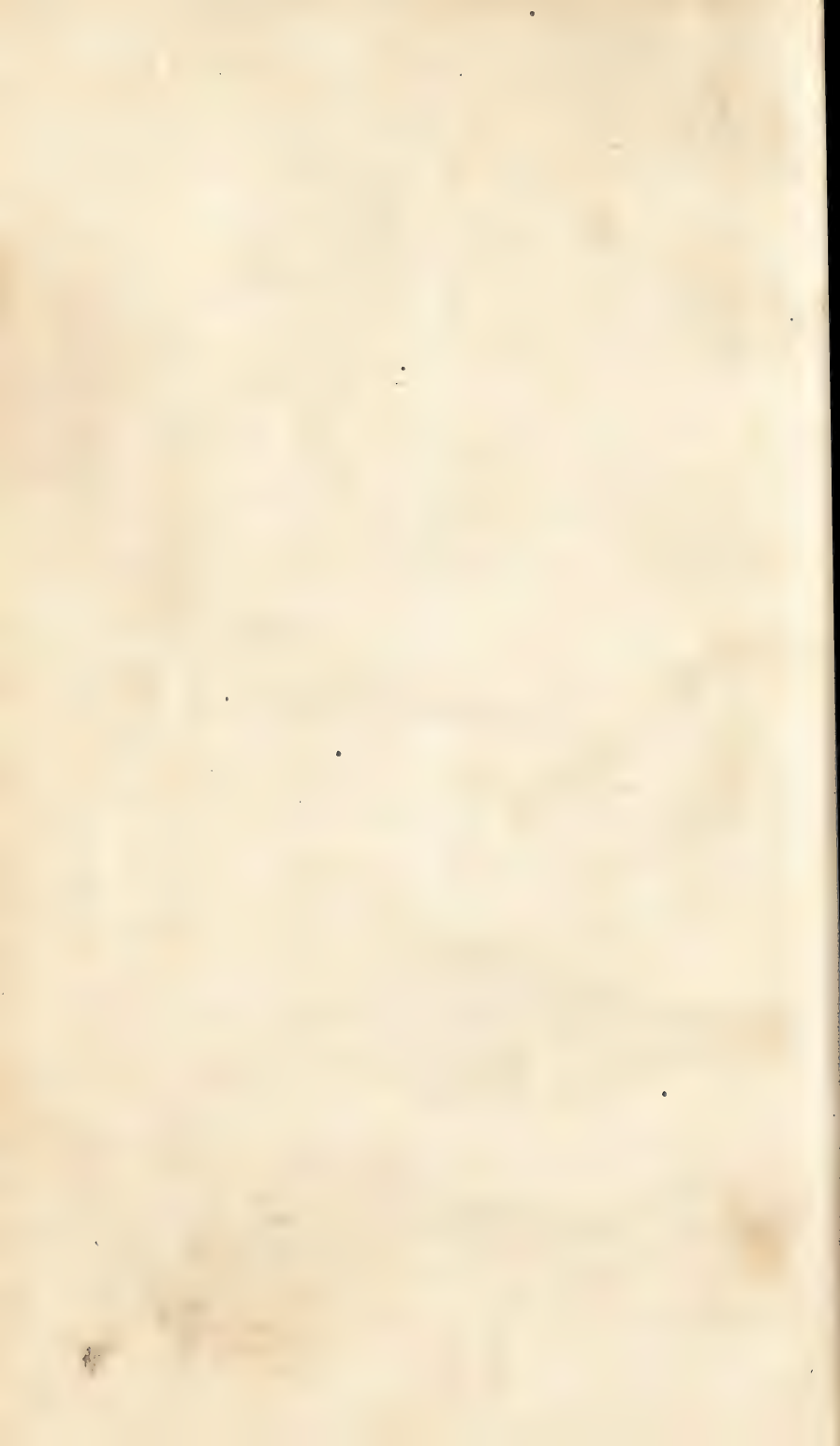
Fig. 4. The WREN

Fig. 5. The UNICORN-FISH.



Fig. 6. The URANOSCOPUS.





ULNARIS, in anatomy, the name of two muscles of the carpus, or hand; one called *ulnaris internus*, which is a flexor muscle terminating in the internal ossicle of the carpus; and the other, called *ulnaris externus*, is an extensor muscle, terminating in the metacarpal bone that supports the little finger.

ULSTER, the most northern province of Ireland, the chief town of which is Londonderry.

ULTERIOR, in geography, is applied to some part of a country or province, which, with regard to the rest of that country, is situated on the farther side of the river, mountain, or other boundary, which divides the country into two parts. Thus Africa, with regard to Europe, is divided, by mount Atlas, into cterior and ulterior, *i. e.* into two portions, the one on this side mount Atlas, and the other on that.

ULTRAMARINE, *ultramarinum*, a beautiful blue colour used by the painters, prepared from lapis lazuli, by calcination. See the article **LAZULI**.

The german lapis lazuli does not answer well in this process, and discovers itself by its calcining easier than the African or Asiatic, and turning greenish. The oriental kind calcines to a finer blue than it naturally has, and retains the colour for ever. After calcining the stone in a clear fire of charcoal, they grind it to an impalpable powder on a porphyry, and then mixing it up in a paste, composed of pitch, wax, and oil, they work it about with the hands; and, finally, kneading this in a vessel of clear water, as the powder separates from the viscid matter, it sinks to the bottom: when all that is perfectly fine in this is worked out, they let the water be drained off, and dry the powder for use. What remains embodied in the paste, is afterwards separated, and makes a worse kind than the former; though even the very meanest ultramarine is a very beautiful colour.

Ultramarine must be chosen of an high colour, and well ground, which may be known by putting it between the teeth, and if it feel gritty, it is a sign it has not been well ground.

To know whether it be pure and unmixed, put a little of it into a crucible, and so heat it red-hot; and if the powder has not changed its colour after this trial, it is certainly pure; on the contrary, if there be any change, or any black specks in it, then it has been adulterated.

There is also a spurious sort, called common or dutch ultramarine; which is only smalt well ground and pulverized. See the article **SMALT**.

ULTRAMONTANE, something beyond the mountains.

The term is principally used in relation to Italy and France, which are separated by the mountains of the Alps.

ULTRAMUNDANE, *ultramundanus*, beyond the world; is that part of the universe supposed to be without, or beyond, the limits of our world, or system.

ULTZEN, a town of Lower Saxony, in Germany, twenty-five miles south of Lunenburg.

ULVA, in botany, a genus of mosses, consisting of a merely foliaceous substance, formed into long cylindrical tubes. This genus includes the tubular tremellæ, and with them all the smooth conservæ of authors. See the article **MOSS**.

ULVERSTON, a market-town of Lancashire, eleven miles north-west of Lancaster.

ULULA, in ornithology, the grey owl, a species of *strix*, with a circle of long feathers, composed of two rows, round its face. See the article **OWL** and **STRIX**.

ULMA, a town of Swedish Lapland, situated at the mouth of a river of the same name, on the Bothnic gulph, two hundred and eighty miles north of Stockholm.

UMBELLÆ, *umbells*, among botanists, the round tufts or heads of certain plants set thick together and all of the same height.

UMBELLIFEROUS PLANTS, are such as have their tops branched and spread out like an umbrella; on each little subdivision of which there is growing a small flower; such are fennel, dill, &c.

This flower is always pentapetalous, and is succeeded by two naked seeds adjoining to each other, which are, according to Ray, the true characteristics that distinguish those plants from others.

UMBER, or **UMBRE**, *umbria*, among painters, &c. a kind of dry dusky-coloured earth, which, diluted with water, serves to make a dark-brown colour, usually called with us a hair-colour. It is called umber, from *umbra*, a shadow, as serving chiefly for the shading of objects; or, rather, from *umbria*, a country of Italy, whence it is used to be brought.

UMBER, or **GRAYLING**, in ichthyology. See the article **GRAYLING**.

UMBILICAL, among anatomists, something relating to the umbilicus, or navel.

See

See the articles **NAVEL** and **ABDOMEN**. The umbilical vessels are an assemblage of two arteries, a vein, and the urachus; which altogether constitute what we call the funiculus umbilicalis, or navel-string. See the article **NAVEL**.

The umbilical arteries arise from the iliaes, near their division into external and internal; and pass thence, on each side of the bladder, through the navel, to the placenta.

The umbilical vein, from innumerable capillaries united into one trunk, descends from the placenta to the liver of the foetus; where it is partly distributed into the porta, and partly into the cava.

The urachus is only plainly found in brutes; though there is no doubt but it has place, likewise, in mankind. See the article **URACHUS**, &c.

The use of these vessels is to maintain a continuity and communication between the mother and the foetus. Some authors will have it, that the foetus receives its food and increase this way, and that it grows like a vegetable from the mother as the root, of which the umbilical vessels are the stem; and the child the head or fruit of this plant animal. See **FOETUS**.

UMBILICAL POINTS, in mathematics, the same with foci.

UMBILICUS, the **NAVEL**, in anatomy. See the article **NAVEL**.

UMBONE, a name used by some for the style or pistil of a flower. See the articles **FLOWER** and **PISTIL**.

UMBRA, or **SHADOW**. See **SHADOW**.

UMBRA, in ichthyology, the sciæna, with the upper jaw longest, and the under one bearded. See the article **SCIÆNA**.

This is a large fish, being frequently five feet in length, and its weight 60 pounds: the ground colour is a dusky olive, with a bluish tinge, and variegated all over with a tinge of other colours: the teeth are small and slender, and there are a great many of them in the fauces, besides those in the jaws.

UMBRE, or **UMBER**, among painters. See the article **UMBER**.

UMBRINO, in ichthyology, the blackish variegated sciæna, with the belly-fins black. See the article **SCIÆNA**.

UMERIATICA, a town of the hither Calabria, in the kingdom of Naples: east long. $17^{\circ} 35'$, north lat. $39^{\circ} 15'$.

UMPIRE, a third person chosen to decide a controversy left to arbitration. See the article **ARBITRATION**.

UNCASING, among sportsmen, signifies

the cutting up, or fleaving of a fox. See the article **HUNTING**.

UNCIA, in general, a latin term denoting the twelfth part of any thing; particularly the twelfth part of a pound, called in english an ounce; or the twelfth part of a foot, called an inch. See the articles **MEASURE** and **WEIGHT**.

UNCIÆ, in algebra, the numbers prefixed before the letters of the members of any power produced from a binomial, residual, or multinomial root. Thus, in the fourth power of $a+b$, viz. $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$, the unciæ are 4, 6, 4; being the same with what others call co-efficients. See **BINOMIAL**, **INVOLUTION**, and **CO-EFFICIENT**.

UNCIAL, *uncialis*, an epithet which antiquaries give to certain large sized letters or characters, antiently used in inscriptions and epitaphs. The word is formed from the latin *uncia*, the twelfth part of any thing, and which in geometrical measure signified the twelfth part of a foot, viz. an inch; which was supposed to be the thickness of the stem of one of those letters.

UNCORE, or *UNQUES prist, still ready*, in law, a plea for the defendant, being sued for a debt due on a bond, &c. at a day past, to save the forfeiture of his bond, &c. by affirming that he tendered the debt at the time and place, and that there was none to receive it, and that he is yet also ready to pay the same. See the article **TENDER**.

UNCTION, *unctio*, the act of anointing or rubbing with oil, or other fatty matter. The cure of divers wounds, ulcers, &c. greatly depend upon repeated unctions with oil, unguents, cerats, &c. For the mercurial unction applied to bring on a salivation, see the article **SALIVATION**.

UNCTION, in matters of religion, is used for the character conferred on sacred things, by anointing them with oil. Uctions were very frequent among the Hebrews. They anointed both their kings and high-priests at the ceremony of their inauguration. They also anointed the sacred vessels of the tabernacle and temple, to sanctify and consecrate them to the service of God. The unction of kings is supposed to be a ceremony introduced very late among the christian princes. It is said, that none of the emperors were ever anointed before Justinian, or Justin. The emperors of Germany took the practice from those of the eastern empire: king Pepin of France

was the first who received the unction. In the antient christian church, unction always accompanied the ceremonies of baptism and confirmation. Extreme unction, or the anointing persons in the article of death, was also practised by the antient christians, in compliance with the precept of St. James, chap. v. 14. and 15 verses; and this extreme unction the romish church has advanced to the dignity of a sacrament. It is administered to none but such as are afflicted with some mortal disease, or are in a decrepit age. It is refused to impenitent persons, as also to criminals. The parts to be anointed are the eyes, the ears, the nostrils, the mouth, the hands, the feet, and the reins. The laity are anointed in the palms of the hands, but priests on the back of it; because the palms of their hands have been already consecrated by ordination. The parts above-mentioned, are anointed in the form of a cross. The priest begins anointing the sick person's eyes, saying, "May God by his holy anointing, pardon you the sins you have committed by the eyes." In like manner he proceeds to the other parts, varying the words according to the parts he anoints.

UNCUTH, *unknown*, is used, in the antient Saxon laws, for him that comes to an inn guest-wise, and lies there but one night, in which case his host is not bound to answer for any offence he committed, whereof he was guiltless himself. See the article **HOGENHINE**.

UNDECAGON, is a regular polygon, of eleven sides. See the article **POLYGON**.

UNDECEM VIR, a magistrate among the antient Athenians, who had ten other colleagues or associates joined with him in the same commission. The function of the undecemviri at Athens, were much the same as those of the prevots de marche in France: they took care of the apprehending of criminals, secured them in the hands of justice, and when they were condemned, took them again into custody, that the sentence might be executed on them. They were chosen by the tribes, each tribe naming its own; and as the number of tribes after Callisthenes was but ten, which made ten members, a scribe or notary was added, which made the number eleven, whence their name *ἐνδεκάρι*, or undecemviri, as Cornelius Nepos calls them in the life of Phocion.

UNDE, **UNDER**, or **UNDY**. See **WAVY**.
VOL. IV,

UNDER the sea, in the sea-language. A ship is said to be so when she lies still, or waits for some other ships, with her helm lashed, or tied up a-lee.

UNDER CURRENTS, currents distinct from the upper or apparent currents of the seas. Some naturalists conclude that there are in divers places under currents which set or drive a contrary way from the upper current, whence they solve the remarkable phenomena of the sea's setting strongly through the Streights into the Mediterranean, with a constant current twenty leagues broad; as also, that running from the Euxine through the Bosphorus into the Hellespont, and thence into the Archipelago: they conjecture, that there is an under current whereby as great a quantity of water is carried out as comes in. To confirm this, it is observed, that between the north and south foreland, it is either high or low water upon the shore three hours before it is so off at sea; a certain sign, that though the tide of flood runs aloft, yet the tide of ebb runs under foot, or close by the ground. Yet Dr. Halley solves the currents setting in at the Streights without overflowing the banks, from the great evaporation, without supposing any under current. See the article **SEA**.

UNDER chamberlain of the exchequer, an officer that clears the tallies written by the clerk of the tallies, and reads the same, in order that the clerk of the pell and the comptrollers thereof may see their entries to be true: he likewise makes all searches for records in the treasury, and has the custody of domesday book. See the article **EXCHEQUER**.

UNDER-SHERIFF, &c. See **SHERIFF, &c.**

UNDER treasurer of England, was an officer said to be first created by king Henry VII. whose duty was to chest up the king's treasure as the end of every term, to note the content of the money in each chest, and see it carried to the king's treasury for the ease of the lord treasurer.

UNDERMINING. See **SAPPING**.

UNDERSTANDING, *intellectus*, is defined by the peripatetics to be a faculty of the reasonable soul, conversant about intelligible things, considered as intelligible. They also make it twofold, *viz.* active and passive. Active understanding, they hold that faculty of the soul by which the species and images of intelligible things are framed, on occasion of the presence of phantasms or appearances thereof. For maintaining the intellect

to be material, they hold it impossible it should be disposed to think by any disproportionate phantasms of mere body, and therefore that it is obliged to frame other proportionate species of itself, and hence its denomination active. Passive understanding, is that which receiving the species framed by the active understanding, breaks forth into actual knowledge. See the article KNOWLEDGE.

The moderns set aside the peripatetic notion of an active understanding. The cartesian define the understanding to be that faculty whereby the mind conversing with, and, as it were, intent on itself, evidently knows what is true in any thing not exceeding its capacity. The corpuscular philosophers define the understanding to be a faculty expressive of things which strike on the external senses, either by their images or their effects, and so enter the mind. Their doctrine is, *nihil esse in intellectu quod non prius fuerit in sensu*; and to this doctrine Mr. Locke, and most of the latest english philosophers, subscribe. See the article IDEA. Between the cartesians and corpuscularians there is this farther difference, that the latter make the judgment to belong to the understanding, but the former to the will. Hence, according to the most approved opinion of the corpuscularians, the understanding has two offices, *viz.* perception and judgment; according to the cartesians, it has only one, *viz.* perception. See the articles PERCEPTION, JUDGMENT, and WILL.

UNDERSTANDING is also used for the act, exercise, or exertion, of this faculty, or the action whereby the mind knows things, or represents them in idea to itself.

UNDERTAKERS, were antiently such persons as were employed by the king's purveyors, and acted as their deputies. At present the name is chiefly used for upholders, or persons who furnish out funerals, and also for such who undertake any great work.

UNDERWALD, a canton of Switzerland, bounded by Switz and Lucern on the north, by Uri on the east, and by another part of Lucern on the west; being about 25 miles long, and as many broad.

UNDERWOOD, *sub-boscus*, is coppice, or any wood that is not accounted timber. See the articles COPPICE and TIMBER. In the cutting the underwood of coppices, when the stubbles are great, they should be stubbed up; for they only take up a

great deal of room, and send up few shoots, their cracks and holes letting in water, and usually half killing them. The taking up these should be performed in winter, and the spaces they leave will be occupied by young trees: if not, a long branch of some neighbouring tree may be laid down, which will soon send up a sufficient supply of suckers for the place. In felling the underwood, it is always proper to leave young trees enough, the worst of which may be taken down the next fall, especially if any of them grow near a great tree that will be fit to fell the next season, because they may be spoiled by its fall.

UNDULATION, in physics, a kind of tremulous motion or vibration observable in a liquid, whereby it alternately rises and falls like the waves of the sea. See the article WAVE.

Thus undulatory motion, if the liquid be smooth and at rest, is propagated in concentric circles, as most people have observed upon throwing a stone, or other matter, upon the surface of a stagnant water, or even upon touching the surface of the water lightly with the finger, or the like. The reason of these circular undulations is, that by touching the surface with your finger, there is produced a depression of the water in the place of contact. By this depression, the subjacent parts are moved successively out of their place, and the other adjacent parts thrust upwards, which lying successively on the descending liquid, follow it; and thus the parts of the liquid are alternately raised and depressed, and that circularly. When a stone is thrown into the liquid, the reciprocal vibrations are more conspicuous: here the water, in the place of immersion, rising higher by means of the impulse, or rebound, till it comes to fall again, gives an impulse to the adjoining liquid, by which means that is likewise raised about the place of the stone as about a center, and forms the first undulous circle; this falling again, gives another impulse to the fluid next to it, farther from the center, which rises likewise in a circle; and thus successively greater and greater circles are produced. See the article IMPULSE.

Undulatory motion is likewise applied to a motion in the air, whereby its parts are agitated after the like manner as waves in the sea; as is supposed to be the case when the string of a musical instrument

is struck. This undulatory motion of the air is supposed the matter or cause of sound. See the article SOUND.

UNGELD, in our antient customs, a person out of the protection of the law: so that if he were murdered, no geld or fine was to be paid, in the way of compensation, by him that killed him.

UNGHWAR, a city of upper Hungary, situated near the foot of the Carpathian mountains: eastlong. $21^{\circ} 30'$, north lat. $48^{\circ} 40'$.

UNGUENT, or OINTMENT, *unguentum*, in medicine and surgery, a topical remedy or composition, chiefly used in the dressing of wounds and ulcers. See the articles WOUND and ULCER.

Unguents are divided into simple and compound, though it so happens that some of the former are considerably compounded; and amongst the latter there are some simple unguents, and others very little compounded. Unguents, liniments, and cerates, are external forms applied on divers parts of the body, both to cure, to ease, and to relieve them. These only differ from each other in their consistence; with regard to which, unguents hold the medium, being stiffer than liniments, but softer than cerates. Oils are the bases of all the three, to which are added wax *axungia*, and several parts of plants, animals, and minerals, both on account of the virtues they furnish, and to give a consistence to the oils, and to keep them longer on the part, that they may have more time to act. See CERATE and LINIMENT.

Any of the officinal plasters, diluted with so much oil as will reduce it to the thickness of stiff honey, forms an ointment; by further increasing the oil it becomes a liniment. See PLASTER.

There are some considerable compositions of this form in the intention of emollients; and amongst the compound unguents there are some which take in a number of very warm aromatic ingredients, and seem designed for paralytic infirmities, and cases that require brisk attenuating applications. At the head of the emollient unguents, is the *unguentum dialthææ*; and among the attenuating ones, the most in esteem is the *unguentum martiatum* and *nervinum*. There are ointments also within the intention of strengtheners; and the next intention of any consequence for which we are provided by this form, and which seems as suitable to it as any, is against

cutaneous foulnesses, as the itch, and such like distempers; and this seems to be the reason that there is such a choice of them now given. But though most of these have the reputation of great antiquity, and hold their places in abundance of officinal dispensaries down to the present, yet they are so uncleanly in use, that they are almost altogether fallen into neglect, unless in some of our hospitals; those which contain mercury being much more neat and efficacious for the same purpose. Some other things of this division are little else than oils wrought into ointments, by the exchange of oil for lard. Pomatums are also ranked among the number of unguents. See the article POMATUM, &c.

UNGUIS, a latin term, signifying a nail of the hand or foot. See NAIL.

UNGUIS, PANNUS, or PTERYGIUM, in medicine and surgery, a preternatural membrane formed upon the coats of the eye, so as to extend itself over the cornea and pupil, and obstruct the sight.

An unguis of the eye happens when the blood-vessels of the tendinous tunic in the corners of the eyes are turgid with blood, through an obstruction or inflammation. When this distemper encreases, there is a sort of carnosous web which covers the eye in whole or in part, in so much that the eyes are offended with the light, and look red sometimes: the web is thin and white, sometimes thicker and more fleshy, rough, obscure and painful; nay, sometimes it becomes cancerous, which is incurable, and ought not to be touched. In the cure, this preternatural coat is to be removed or taken off by abstergent and gently corroding medicines, or by the hand of a surgeon. The medicines in use are sugar-candy, honey, white-wine, bone of the cuttle-fish, burnt hartshorn, and calcined egg-shells; as also water of eve bright, the greatcelandine, and the fennel, in which crecus metallorum may be infused: particularly the gall of pike dissolved in a proper water; that is, two ounces to one of the gall. Some recommend a water distilled from the dung of young geese in April. If the disorder be obstinate, the juice of the greatercelandine may be used diluted in fennel-water. The following collyrium is proper: Take of prepared lapis hæmatitis, half a scruple; of whitevitriol, twenty-five grains; of myrrh and saffron, each five grains; of white-sugar candied, one scruple. Reduce this

mixture to a powder, and then mix it with equal parts of the waters of roses, eye-bright, and fennel, and apply it to the eye with a feather, taking care not to injure the pupil. If these methods are insufficient for destroying the pellicle, it must then be extirpated; in order to which, the patient being in a proper posture, the surgeon takes the small hook (plate CCXCVI. fig. 2. n^o 1.) and endeavours to pass its point under the thickest and loosest part of the pellicle; and endeavours, by this means, to elevate it a little. In the next place he takes the needle *a* (*ibid.* n^o 2.) armed with a thread, and passing it under the pellicle, ties it with a double knot; and then fastening the two ends in a loop, (*ibid.* n^o 3.) he thereby attempts to make a gentle elevation. This done, he endeavours to separate the upper and lower margin of the membrane with a lancet, that he may afterwards cut off the rest immediately in a straight line near the lachrymal caruncle, by a pair of small and straight scissars: he then draws back the thread and membrane towards the cornea; and if it adheres any where to the eye, frees it by degrees with a scalpel or scissars; in doing which he must take care not to injure the cornea, and observe that no part of the membrane be left adhering to the eye, though it is better to have some part of the unguis adhering to the cornea, when the separation is difficult, than to wound the cornea and leave scars in it; because any small portion of the membrane left behind may be taken off afterwards by heating the eye with gentle escharotics.

UNGUIS, in anatomy, is applied to two bones of the nose, being as thin as scales, and resembling the nail; whence their name. The unguis are the smallest bones in the upper jaw, and are situated near the great canthus of the eyes. Some authors call them ossa lacrymalia; others, orbitaria-ossa. They are contiguous to four other bones, *viz.* the coronal; that of the nose; the maxillary; and that part of the ethmoides which forms the orbit.

UNGUIS, among botanists, the narrow part where the petals are inserted when several go to make up the flower, as the broader part towards the end is called bractea.

UNGUIS ODORATUS, the NAIL-LIKE SWEET SHELL, in pharmacy, a medicine famous among the antients; but has,

for a long time, been out of credit: and the consequence of the neglect that has been shewn it is the losing its real history, and the mistaking different substances of the same origin and nature, though the produce of different animals, for it. We call what we suppose to be the unguis odoratus of the antients, blatta byzantia; the truth is, however, that our blatta byzantia, or sweet-hoof, is not the same with the unguis odoratus of the antients, though nearly allied to it. The true unguis odoratus of the antients, is a thin, flat, testaceous substance, of an oblong or oval figure, rounded at both ends, and marked on the surface with three or four concentric circles, or oval lines: its colour is a dusky-brown with some admixture of the orange, sometimes of a purplish tinge: its usual size is that of a full grown nail of a man's thumb, and its thickness about the same with that of the nail: it is tough, flexible, and elastic; and has no peculiar smell or taste. Besides this genuine unguis odoratus, they had another smaller kind: both are the opercula of shells of the murex kind, frequent in the Red-sea. The blatta byzantia is also the operculum or cover of a murex, as well as the unguis odoratus; but it belongs to a different species of that genus: there are also two kinds of the blatta byzantia, which are naturally without smell and taste.

UNGULA, in geometry, the section of a cylinder cut off by a plane passing obliquely through the plane of the base and part of the cylindric surface.

UNGULA, in natural history, the claw or hoof of a quadruped. See HOOF.

UNICORN, *μονοκερας*, an animal, famous among the antients, but looked on by the moderns as fabulous, denominated from its distinguishing characteristic of having one horn only, which is represented as five palms long, and growing in the middle of the forehead. It is also said to be about the size of an horse: its hair short, and of a darkish brown colour, very timorous, and therefore keeping mostly in the woods. Some will have it an amphibious animal, and its horn moveable at pleasure. Others make all its strength to consist in its horn; and add, that when pursued by the hunters, it precipitates itself from the top of the highest rocks, and pitches upon its horn, which sustains the whole effort of its fall, so that it receives no damage thereby. It is added, that it is wonderfully fond of chaste

chaste persons; and therefore, in order to take it, a virgin is placed in its way, whom, when the unicorn spies, he lies down by her, lays his head in her lap, and falls asleep; upon which, the virgin making a signal, the hunters come in and take the beast; which could never be caught by any other means, because it would either cast itself from a rock or die.

The unicorn is one of the supporters of the british arms. It is represented by heralds passant, and sometimes rampant. When in this last action, as in the british arms, it is properly said to be saillant. Argent, an unicorn sejant sable, armed and unguled, or, borne by the name of harding.

UNICORN-FISH, in ichthyology, a species of the monodon, or narwal, an extremely singular fish; the length of a full-grown one being about five and twenty feet, but commonly from sixteen to twenty: it has only one tooth, remarkably long, which is fixed in the upper-jaw, and runs parallel with the length of the fish, so that it has more the appearance of a horn than a tooth. See the article NARWAL.

The diameter of this fish equals, at least, half its length, whence it is very unwieldy: the head is small, and shaped like that of a roach: there is no fin on the back; and the fistule is in the vertex or uppermost part of the head. The tooth grows to ten, or more, feet in length, is about the thickness of a man's wrist towards the base, and thence becomes gradually smaller all the way to the point. See plate CCXCVI. fig. 5.

UNICORNU, FOSSILE, *Fossil unicorn's horn*, the name of a substance much used in medicine in some parts of the world, and, which seems to have been very little understood by many who have written of it; but is now determined to be no other than a terrene, crustaceous spar, not very different from the osteocolla and other bodies of that genus called the cibdeloplacium. See the article OSTEOCOLLA and CIBDELOPLACIA.

It is esteemed as a sudorific and astringent, and is given in fevers attended with diarrhoeas, with great success.

UNIFORM denotes a thing to be similar, or consistent, either with another thing or with itself, in respect of figure, structure, proportion, and the like; in which sense it stands opposed to difform. See the article DIFFORM.

Thus the uniform flowers of plants are such as are of the same figure all around, having their fore and back parts, as also their right and left parts, exactly alike. For uniform motion, &c. see the article MOTION and EQUABLE.

UNIFORMITY, a similitude, or resemblance, between the parts of a whole: such is that we meet with in figures of many sides, and angles respectively equal, and answerable to each other.

This term is particularly applied to one and the same form of public prayers and administration of sacraments, and other rites, &c. of the church of England, prescribed by the famous stat. 1 Eliz. and 14 Car. II. called the act of uniformity.

UNIOLA, in botany, a genus of the triandria-digynia class of plants, the corolla whereof consists of a bivalve glume: the valves are of a lanceolato-compressed figure like those of the cup: the inner valve appears somewhat higher than the outer one: the corolla performs the office of a pericarpium, inclosing the seed, which is single, and of an ovated oblong figure.

UNION, a junction, coalition, or assemblage of two or more different things in one.

UNION, among painters, expresses a symmetry and agreement between the several parts of a painting, when *e. gr.* there is a great deal of relation and connection between them, both as to the figuring and colouring; so that they apparently conspire to form one thing.

UNION, in architecture, may denote a harmony between the colours in the materials of a building.

UNION, in an ecclesiastical sense, denotes a combining or consolidating of two churches into one. There are two kinds of this union, as when one church is made subject to another, and one parson is made rector of both; and where a conventual church is made a cathedral. In case two churches were so small as that the tithes did not make a competent provision for each of the parsons, they might be united at common law before any act of parliament was made for that purpose. By statute there may be an union of two churches where there lie not above a mile distant from each other, and where the value of the one exceeds not six pounds a year in the king's books of first fruits; which is done by the consent of the bishop, the patron, and incumbent. Also, in

In cities or corporate towns, it is ordained, that the bishop, the patron, and the mayors, or chief magistrates of the place, &c. may unite parish-churches therein: yet, when the income of the church is above one hundred pounds *per annum*, there the major part of the parishioners are to agree to the same; and after the union, the patrons of those churches shall present by turns, &c. but notwithstanding each of the parishes continue distinct as to rates, charges, &c.

UNION, or the **UNION**, by way of eminence, is more particularly used to express the act whereby the two separate kingdoms of England and Scotland were incorporated into one, under the title of the kingdom of Great-Britain. This happy union, in vain attempted by king James I. was at length effected in the year 1707, by the general consent of the queen and the estates of each realm. The chief articles of this union are, That the two kingdoms shall be united into one kingdom, by the name of Great-Britain: that they, in consequence thereof, be represented by one parliament, of which sixteen peers and forty-five commoners are to be elected for Scotland, and have the same privileges with those of England: that the subjects of either nation shall have equal freedom of trade, and be liable to the same customs, and the like laws for public government, &c. The kirk, or church of Scotland, is confirmed; and the courts of justice are to remain the same as they were before the union, yet subject to regulation, &c. A court of exchequer is also erected in Scotland, to be a court of record, revenue, and judicature, for ever; and barons of the said court are appointed, who shall be the judges there, &c. See the articles **PEER**, **PARLIAMENT**, &c.

UNISON, in music, the effect of two sounds which are equal in degree of tune, or in point of gravity and acuteness. See the article **TUNE**.

Unison may be defined a consonance of two sounds produced by two strings, or other bodies, of the same matter, length, thickness, tension, &c. equally struck, and at the same time: so that they yield the same tone or sound. See **SOUND**.

Unison is the first and greatest of concords, and the foundation of all the rest, according to Aristoxenus and most of the antients: yet some deny it to be any concord at all, maintaining it to be only that in sounds which unity is in numbers.

Others restrain the word concord to intervals, and make it include a difference of tune; but this is precarious: for as the word concord signifies an agreement of sounds, it is certainly applicable to unisons of the first degree.

But though unisonance, or an equality of tune, makes the most perfect agreement of sound, it is not true, that the nearer any two sounds come to an equality of tune, they are the more agreeable. The mind is delighted with variety; and the reason of the agreeableness or disagreeableness of two sounds must be ascribed to some other cause than the quality or inequality of the number of their vibrations. It is a famed phenomenon in music, that an intense sound being raised, either with the voice or sonorous body, another sonorous body near it, whose tune is either unison or octave to that sound, will sound its proper note, unison or octave, to the given note. The experiment is easily tried by the strings of two instruments, or by a voice and harpsichord; or a bell, or even a drinking-glass.

This our philosophers account for thus; one string being struck, and the air put in motion thereby, every other string, within the reach of that motion, will receive some impression therefrom: but each string can only move with a determinate velocity of recourses or vibrations; and all unisons proceed from equal or equidurnal vibrations; and other concords, from other proportions. The unison string then, keeping equal pace with the sounding string, as having the same measure of vibrations, must have its motion continued, and still improved, till its motion become sensible, and it gives a distinct sound. Other concurring strings have their motion propagated in different degrees, according to the frequency of the coincidence of their vibrations, with those of the sounded string; the octave, therefore, most sensibly: then in the fifth; after which the crossing of the motions prevents any effect.

This they illustrate by the pendulum, which, being set a moving, the motion may be continued, and still improved, and augmented, by making frequent, light, coincident impulses; as blowing on it when the vibration is just finished: but if it be touched by any cross or opposite motion, and this too frequently, the motion will be interrupted and cease altogether.

altogether. So of two unison-strings, if the one be forcibly struck, it communicates motion by the air to the other : and being equidurnal in their vibrations, that is, finishing them precisely together, the motion of the other will be improved and heightened by the frequent impulses received from the vibrations of the first ; because given precisely, when that other has finished its vibration and is ready to return : but if the vibration of the chords be unequal in duration, there will be a crossing of motions less or more, according to the proportion of the inequality ; by which the motion of the untouched string will be so checked as never to be sensible. And this, we find, is the case in all consonances, except unison, octave, and the fifth.

UNIT, UNITE, or UNITY, in arithmetic, the number one, or one single individual part of discrete quantity. See the article **NUMBER**.

UNITED NETHERLANDS consist of the provinces of Holland, Zealand, Friesland, Groningen, Overijssel, Gelderland, with Zutphen and Utrecht ; these are bounded by the German-sea on the north and west ; by the circle of Westphalia on the east, and by Flanders, Brabant, and the dutchy of Cleves on the south ; lying between $3^{\circ} 20'$ and $7^{\circ} 30'$ east longitude, and between $51^{\circ} 35'$ and $52^{\circ} 40'$ north latitude ; being about fifty miles long, and as many broad, including the Zuyder-sea, which takes up a considerable space between these limits. See the articles **NETHERLANDS**, **PROVINCES**, **ZEALAND**, &c.

UNITY, in poetry. In the drama there are three unities to be observed, *viz.* the unity of action, that of time, and that of place. In the epic poem, the great, and almost only, unity, is that of the action. Some regard, indeed, ought to be had to that of time ; that of place there is no room for. The unity of character is not reckoned among the unities. See the article **EPIC**, &c.

The unity of the dramatic action consists of the unity of the intrigue in comedy, and that of the danger in tragedy ; and this not only in the plan of the fable, but also in the fable extended and filled with episodes. See **COMEDY**, &c.

The episodes are to be worked in without corrupting the unity, or forming a double action ; and the several members are to be so connected together, as to be consistent with that continuity of action so

necessary to the body, and which Horace prescribes, when he says,
Sic quodvis simplex duntaxat & unum.
See the article **EPISODE**.

The unity of the epic action, Mr. Dacier observes, does not consist in the unity of the hero, or in the unity of his character and manners, though these be circumstances necessary thereto. The unity of action requires that there be but one principal action, of which all the rest are to be incidents or dependencies. See **ACTION**, F. Bossu assigns three things requisite thereto ; the first, that no episode be used but what is fetched from the plan and ground of the action, and which is a natural member of that body ; the second, that the episodes and members be well connected with each other ; the third, is not to finish any episode, so as it may appear a whole action, but to let each be always seen in its quality of member of the body, and an unfinished part.

UNITY of possession, in law, signifies a joint possession of two rights by several titles.

UNIVALVE Shells, in natural history, a term used to express one of the three general classes of shell-fish ; the other two being the bivalves and multivalves. See **SHELL**, **BIVALVES**, and **MULTIVALVES**. The univalve shells are those which consist only of one piece, not of two or more joined together. Of these univalve shells, nature affords a very great variety ; so that they are aptly distributed by a late French author into fifteen distinct genera. These are, 1. The patellæ, or limpets. 2. The patellæ planæ, called also auris marina, the ear-shell. 3. The canales, or tubuli marini, the sea-tubes. 4. The lunar cochleæ, or round-mouthed snails. 5. The cochleæ semilunares, or snails with semicircular mouths. 6. The cochleæ ore depresso, or flat-mouthed snails. 7. The naviculæ or boat-shells, commonly called nautili or nautilus. 8. The buccina, or trumpet-shells. 9. The turbines. 10. The volutæ. 11. The rhombi. 12. The murices. 13. The purpuræ. 14. The conchæ globosæ. And 15. The porcellanæ, each of which see under its proper head, **PATELLA**, **AURIS Marina**, &c. Hist. Nat. Ecclairc. part II. p. 235.

UNIVERSAL, something that is common to many things ; or it is one thing belonging to many, or all things.

In logic, universal is either complex or incomplex. A complex universal is either an universal proposition, as every whole

whole is greater than its part ; or whatever raises a manifold conception in the mind, as the definition of a reasonable animal. An incomplex universal, is what produces only one conception in the mind, and is a simple thing respecting many ; as human nature, which relates to every individual wherein it is found.

UNIVERSALITY, that quality which denominates a thing universal. See the preceding article.

UNIVERSE, a collective name, signifying the whole world, or the assemblage of heaven and earth, with all things therein. See **HEAVEN** and **EARTH**.

As space is, in its own nature, every way infinite, it gives us an idea of the infinity of the universe, which can therefore be only in part comprehended by us : and that part of the universe which we can have any notion of, is that which is the subject of our senses ; and of this the eye presents us with an idea of a vast extended prospect, and the appearance of various sorts of bodies disseminated thro' the same.

The infinite abyss of space, which the Greeks call *το πᾶν*, the Latins *inane*, and we the universe, does undoubtedly comprehend an infinity of systems of moving bodies round one very large central one, which the Romans called *sol*, and we the sun. This collection of bodies is therefore properly called the solar system, and sometimes the mundane system, from the latin word *mundus*, the world. See the article **SYSTEM**.

That the universe contains as many solar systems or worlds, as there are what we called fixed stars, seems reasonable to infer from hence, that our sun, removed to the distance of a star, would appear just as a star does, and all the bodies moving about it would disappear entirely. Now the reason why they disappear, is because they are opake bodies, and too small to be seen at so great a distance, without an intense degree of light ; whereas theirs is the weakest that can be, as being first borrowed, and then reflected to the eye. See the article **STAR**.

But the sun, by reason of his immense bulk and innate light, which is the strongest possible, will be visible at an immense distance ; but the greater the distance, the less bright it will appear, and of a lesser magnitude : and therefore every star of every magnitude, may probably be a sun like our own, informing a system of planets, or moving bodies, each of which

may be inhabited like our earth, with various kinds of animals, and stored with vegetable and other substances.

We can perceive, says Mr. Mac Laurin, no bounds of the vast expanse in which natural causes operate ; nor can we fix any border or termination of the universe ; and we are equally at a loss to trace things to their elements, and to discover the limits, which inclose the subdivisions of matter. The objects, which we commonly call great, vanish when we contemplate the vast body of the earth : the terraqueous globe itself is soon lost in the solar system ; being in some parts seen as a planet, or distant star ; and, in great part of the system unknown, or visible only at rare times to vigilant observers, assisted perhaps with instruments like our telescopes. The sun itself dwindles into a star : saturn's vast orbit, and the orbits of all the comets, croud into a point, when viewed from numberless places between the earth and the nearest fixed stars. Other suns illuminate other systems, where our sun's rays are unperceived : but all these also are swallowed up in the vast expanse of the universe. Even all the systems of the stars that sparkle in the clearest sky, must possess a small corner only of that space over which such systems are dispersed. And after we have risen so high, and left all definite measures so far behind us, we find ourselves no nearer to a term or limit ; for all this is nothing to what may be displayed in the infinite expanse, beyond the remotest stars that ever have been discovered.

In this view of the universe, an august idea arises in the mind, worthy of the infinite and wise author of nature, who can never be supposed to have created so many glorious orbs, to answer so trifling a purpose as the twinkling to mortals by night now and then ; besides that the far greatest part of the stars are never seen by us at all, as has been shewn under **STAR**.

UNIVERSITY, *universitas*, a collective term, applied to an assemblage of several colleges, established in a city, or out town, wherein are professors in the several sciences, appointed to teach them to students ; and where degrees or certificates of study in the divers faculties are taken up. See **ART** and **SCIENCE**.

In each university four faculties are usually taught, theology, medicine, law, and the arts and sciences. See the article **THEOLOGY**, &c.

They are called universities, or universal schools,

schools, by reason the four faculties are supposed to take in the whole compass of study. See the article **FACULTY**.

In the eye of the law, an university is held a mere lay body, or community; though, in reality, it be a mixed body, composed partly of laymen, and partly of ecclesiastics. See **COMMUNITY**, &c.

Universities had their first rise in the XIIth and XIIIth centuries. Those of Paris and Bologna pretend to be the first that were set on foot; but then they were on a different footing from the universities among us. See **SEMINARY** and **SCHOOL**. Our own universities, of Oxford and Cambridge, seem intitled to the greatest antiquity of any in the world; and Baliol and Merton colleges in Oxford, and St. Peter's in Cambridge, all made colleges in the XIIIth century, may be said to be the first regular endowments of this kind in Europe.

For though University college in Cambridge had been a place for students ever since the year 872, yet this, like many of the other antient colleges beyond sea, and Leyden to this day, was no proper college; but the students, without any distinction of habit, lived in citizens houses, having only meeting places to hear lectures and dispute.

In after-times there were houses built for the students to live in society; only each to be at his own charge, as in the inns, of courts: these, at first, were called inns, but now halls. At last, plentiful revenues were settled on several of these halls, to maintain the students in diet, apparel, &c. and these were called colleges. See **OXFORD**, **CAMBRIDGE** and **COLLEGE**. The universities of Oxford and Cambridge are governed next under the king, by a chancellor, who is to take care of the government of the whole university, to maintain the liberties thereof, &c. Under him is the high-steward, whose office is to assist the chancellor, and other officers, when required, in the execution of their offices, and to hear and determine capital causes, according to the laws of the land, and the privileges of the university. The next officer is the vice-chancellor, who officiates for the chancellor in his absence. There are also two proctors, who assist in the government of the university, particularly in the business of school-exercise, taking up degrees, punishing violators of the statutes, &c. Add to these a public orator, keeper

of records, register, beadles, and verger. The universities of Scotland are four, *viz.* those of St. Andrews, Aberdeen, Edinburgh, and Glasgow. See the articles **ST. ANDREW'S**, **ABERDEEN**, &c. In Ireland there is only one university, *viz.* that of Dublin. See **DUBLIN**.

UNIVOCAL, in the schools, is applied to two or more names, or terms, that have but one signification, in opposition to equivocal, which is where one term has two or more significations. See **EQUIVOCAL**. Our univocal terms are such, whose name as well as nature, is the same, in opposition to equivocals, whose names are the same, but their natures very different.

The antients believed that all perfect animals were produced by univocal generation; that is, by the sole union or copulation of a male and female of the same species or denomination; and that insects were produced by equivocal generation, without any seed, and merely of the corruption of the earth, exhaled, and, as it were, impregnated, by the sun's rays: but this doctrine of insects is now exploded. See **GENERATION**.

UNLAWFUL, illegal, something prohibited by, or contrary to, the terms of law, either divine or human. See **LAW**.

UNLAWFUL ASSEMBLY, the meeting of three or more persons together, by force to commit some unlawful act, as to assault any person, to enter his house or land, &c. and thus abiding together, whether they attempt the execution or not. See the article **RIOT**.

UNLIMITED, or **INDETERMINATE PROBLEM**, is such a one as is capable of infinite solutions. See **PROBLEM**.

UNMOOR, a term used at sea: when a vessel which was riding at anchor weighs the same, or gets it up, in order to sail, they say she is unmooring.

UNNA, a town of Westphalia, thirty-five miles south of Munster, subject to the king of Prussia.

UNNA is also a river of Bosnia, forming part of the boundary between Christendom and Turkey, and falling into the Save.

UNSEELING, in falconry, is the taking away the thread that runs through a hawk's eye-lids, and hinders its sight.

VOCABULARY, *vocabularium*, in grammar, denotes the collection of the words of a language, with their significations, otherwise called a dictionary, lexicon, or nomenclature. See **DICTIONARY**, &c.

A vocabulary is properly a lesser kind of dictionary which does not enter so minutely into the origins and different acceptations of words. See WORD.

VOCAL, something that relates to the voice or speech: thus vocal music is that set to words, especially verses, and to be performed by the voice, in contradistinction to instrumental music, composed only for instruments, without singing. See the article VOICE, VERSE, &c.

VOCATIVE, in grammar, the fifth state or case of nouns. See the articles NOUN and CASE.

When we name the person we are speaking to, or address ourselves to the thing we are speaking of, as if it were a person, the noun, or name, requires a new relation, which the Latins and Greeks express by a new termination, called the vocative; as from *dominus*, a lord, is formed the vocative *domine*, o lord.

In English, and most of the modern languages, the vocative is expressed in nouns that have an article in the nominative, by omitting that article; as *the Lord is my hope*; *Lord, thou art my hope*: though, on many occasions, we use an interjection.

VOGHERA, a town of the dutchy of Milan, in Italy, fifteen miles south-west of Pavia.

VOICE, *vox*, a sound produced in the throat and mouth of an animal, by an apparatus of instruments for that purpose. See the article SOUND.

Voices are either articulate or inarticulate. Articulate voices are those whereof several conspire together to form some assemblage or little system of sounds; such are the voices expressing the letters of an alphabet, numbers of which joined together, form words. Inarticulate voices are such as are not organized, or assembled into words; such is the barking of dogs, the braying of asses, the hissing of serpents, the singing of birds, &c.

The formation of the human voice, with all the varieties thereof observed in speech, music, &c. makes a very curious article of inquiry; and the apparatus and organism of the parts administering thereto, is something exceedingly surprising. Those parts are the trachea or wind-pipe, through which the air passes and repasses into the lungs; the larynx, which is a short cylindric canal at the head of the trachea; and the glottis, which is a little oval cleft or chink left between two

femicircular membranes stretched horizontally within the larynx; which membranes, though capable of joining close together, do generally leave an interval, either greater or less, between them called the glottis. A particular description of each part may be seen under the articles TRACHEA, LARYNX, and GLOTTIS.

The long canal of the trachea, terminated at top with the glottis, appears so like a flute, that the antients made no doubt but the trachea contributed the same to the voice, as the body of the flute does to the sound of that instrument. Galen himself fell in some measure into the mistake; he perceived indeed, that the principal organ of the voice was the glottis, but he still allowed the trachea a considerable share in the production of the sound. Galen's opinion was followed by all the antients after him, and even by all the moderns before M. Dodart; but that author observes, that we do not either speak or sing when we inspire or take in the air, but only when we expire or expel it; and that the air coming out of the lungs, passes always out of the minuter vessels of that part into larger, and at last into the trachea itself, which is the largest of all: that thus its passage becoming still more free and easy, and thus more than ever in the trachea, it can never undergo such a violence, and acquire such a velocity in that canal, as is required to the production of sound: but that as the aperture of the glottis is very small, in comparison with the width of the trachea, the air can never get out of the trachea by the glottis, without a vast compression and augmentation of its velocity; and that by this means in passing, it communicates a brisk agitation to the minute parts of the two lips of the glottis, and gives them a kind of spring, and occasions them to make vibrations, which communicated to the passing air, are what really occasion the sound. The sound thus formed, proceeds into the cavity of the mouth and nostrils, where it is reflected and resounds; and on this resonance, M. Dodart shews, it is that the agreeableness of the voice intirely depends. The different consistences, forms, &c. of the divers parts of the mouth, contribute to the resonance, each in their way; and from this mixture of so many different resonances in their due proportion, there results an harmony in the human voice inimitable

inimitable by any musician. Hence it is that when any of these parts are disordered, *e. g.* when the nose is stopped, the voice becomes displeasing. This resonance in the cavity of the mouth, does not seem to consist in a simple reflection, such as that of a vault, &c. but in a resonance proportionate to the tones of the sound sent into the mouth from the glottis; and accordingly we find this cavity to lengthen and shorten itself, according to the depth or acuteness of the tone. See the articles **SOUND**, **TONE**, &c.

As the organs that form the voice make a kind of wind instrument, one might imagine to find some provision therein answerable to that which produces the difference of tone in some other wind-instruments. The tone, therefore, must be attributed either to the mouth and nostrils, which occasion the resonance, or to the glottis, which produces the sound; and as all the different tones are produced in man by the same instrument, it follows, that the part which produces them, must be capable of changes answerable thereto. The different apertures of the lips of the glottis, it is proved, produce all the different tones in the several parts of music, and the manner is thus. The voice, it is shewn, can only be formed by the glottis, but the tones of the voice are modifications of the voice, and these can only be produced by the modifications of the glottis. Now the glottis is capable only of one modification, which is the mutual approach or recess of its lips; it is this, therefore, produces the different tones. Now that modification includes two circumstances; the first and principal is, that the lips are stretched more and more from the lowest tone to the highest: the second is, that the more they are stretched, the nearer they approach. From the first, it follows, that their vibrations will be so much the quicker, as they come nearest their highest tone; and that the voice will be just, when the two lips are equally stretched; and false, when unequally; which agrees perfectly well with the nature of string instruments. From the second, it follows, that the higher the tones are, the nearer will they approach to each other, which agrees perfectly well with instruments governed by reeds or plugs.

The degrees of tension of the lips, are the first and principal cause of tones, but their differences are insensible; the de-

grees of approach are only consequences of that tension, but their differences are more easily assigned. They are different apertures that produce, or at least that accompany, different tones, both in natural wind-instruments, and artificial ones; and the diminution of the aperture, raises the tones both of the glottis, and the reed.

VOICE, in grammar, a circumstance in verbs, whereby they come to be considered as either active or passive, *i. e.* either expressing an action impressed on another subject, as, *I beat*, or receiving it from another, as, *I am beaten*. See the articles **ACTIVE** and **PASSIVE**.

The Greeks have a third voice called the medial voice, thus denominated, because it has sometimes an active and sometimes a passive signification; though generally it is of an active signification. With regard to the termination of this medial voice, it is to be observed, that the present and imperfect tenses are the same with those of the passive voice; or, in other words, when these tenses of the passive voice are taken actively, they are then denominated of the medial voice.

VOICE, in matters of election, denotes a vote or suffrage. See the article **VOTE**. In this sense a man is said to have a deliberative voice, when he has a right to give his advice and opinion in a matter of debate, and his suffrage is taken. An active voice, when he gives his vote for the election of any one; and a passive voice, when the suffrages may fall on himself to be elected. An excitative voice, when he may act to procure another to be elected. A consultative voice, when he can only offer reasons and remonstrances, whereon the chief or head determines at his own discretion.

VOID SPACE, in physics. See the article **VACUUM**, &c.

VOID and **VOIDABLE**, are terms frequently used in our law; as a thing that is done contrary to law at the time of the doing, it is said to be void, and no person shall be bound thereby. But where a thing is only voidable, and not void, though it be what the person that did it ought not to have done, yet when it is done, the deed cannot avoid the same, notwithstanding by some act in law it may be void in his heir, &c. It has been held, that the bond of an infant, or one non compos mentis, is void, because the law has not appointed the doing anything to avoid such bonds. A lease for term

of life, which is voidable, must be made void by re-entry, &c. and a deed is generally avoided by special pleading.

VOIDANCE, or **VACANCY**, in the canon law, a want of an incumbent upon a benefice, &c. See the articles **AVOIDANCE** and **VACANCY**.

VOIDED, in heraldry, is understood of an ordinary whose inner or middle part is cut out, leaving nothing but its edges to shew its form, so that the field appears through it. Hence it is needless to express the colour or metal of the voided part, because it must of course be that of the field. The cross voided, differs from the cross fimbriated, in that the latter does not shew the field through it, as the other does; and the same obtains in other ordinaries.

VOIDER, in heraldry, one of the ordinaries whose figure is much like that of a flask of flanch, only that it doth not bend so much. See plate CCXCVII. fig. 5.

VOIDING, or **EVACUATING**, in medicine. See the article **EVACUATION**.

VOIR-DIRE, in law, a term used where there is a busy evidence not otherwise to be excepted against, and it is prayed upon a trial at law that the witness may on oath speak the truth, whether he shall get or lose by the matter in controversy; and in case it appears that he is unconcerned and disinterested, his testimony is allowed, otherwise it is not. A witness upon a voir-dire, may be examined by the court if he be not a party interested in the cause, as well as the party for whom he is an evidence, *viz.* the plaintiff or defendant.

VOL, among heralds, signifies the two wings of a fowl joined together, borne in armoury, as being the whole that makes the flight. Accordingly, a demi-vol is a single wing.

VOLA, the palm or inside of the hand, comprehended between the fingers and the wrist.

VOLANO, or **VALONA**, a port-town of Italy, in the pope's territory, and dutchy of Ferrara, situated on one of the mouths of the Po, on the gulph of Venice, forty miles east of Ferrara.

VOLANT, in heraldry, is when a bird in a coat of arms is drawn flying, or having its wings spread out.

VOLATILE, in physics, is commonly used to denote a mixed body whose integral parts are easily dissipated by fire or heat; but it is more properly used for

bodies whose elements or first component parts are easily separated from each other, and dispersed in air. For as any mixed body is said to be fixed in a double sense, so may it be said to be volatile two ways; whence the same body, *e. gr.* mercury, is both volatile and fixed at the same time; since, as its integral parts, or those which still retain the nature of mercury, are easily separable by fire, and readily flies away, it is said to be volatile; and yet as it is very difficult to destroy its contexture, and resolve it by fire, or any other menstruum, into its first elements, it is said to be fixed; the same may be said of sulphur, antimony, &c. See the article **FIXED BODIES**.

Minerals, for the generality, are less volatile than vegetables, and vegetables are less so than animals. The chemists distinguish greatly between volatile salts and fixed salts. The capitals of aludels stop and collect the volatile parts of substances in sublimation, and make what we call flowers. See the articles **FLOWERS**, **SALTS**, &c.

The particles of fluids which do not cohere very strongly together, says Sir Isaac Newton, and are of such a smallness as renders them most susceptible of those agitations which keep liquors in a fluor, are most easily separated and rarified into vapour; and, in the language of the chemists, they are volatile, rarifying with an easy heat, and condensing with cold. But those which are grosser, and by that means less susceptible of agitation, or cohere by a stronger attraction, are not separated without a stronger heat, or perhaps not without fermentation; these are what the chemists call fixed bodies.

When the fire decomposes any mixed body, the parts most disposed to receive a great motion are soonest loosened, and rise up in the order which the differences of that disposition give them, the rest remaining immovable at the bottom of the vessel. Those that rise first are called volatile parts; such are phlegm, oil, spirits and salts, both urinous and alkalious. The parts remaining, *viz.* earth and lixivial salts, are called fixed. See the articles **PHLEGM**, **OIL**, &c.

VOLATILISATION, or **VOLATILIZATION**, the act of rendering fixed bodies volatile, or of resolving them by fire into a fine subtiler vapour or spirit, which easily dissipates and flies away. All bodies, even the most fixed, as gold, may be volatilized;

latized ; either of themselves, or with the admixture of some volatile substance, or spirit, by distillation or sublimation. See the articles **GOLD**, **DISTILLATION**, &c.
VOLATILITY. See the articles **VOLATILE** and **SUBLIMATION**.

VOLCANQ, or **VULCANO**. See the article **VULCANO**.

VOLERY, a great bird-cage, so large that the birds have room to fly up and down in it.

VOLHINIA, or **VOLONIA**, a province of Poland, bounded by Polesia, on the north; by the lower Volhinia, or Ukrain, in the territories of Russia, on the east; by Podolia, on the south; and by the province of Red Russia, on the west.

VOLITION, the act of willing. See the article **WILLING**.

VOLKAMERIA, in botany, a genus of the didynamia - angiospermia class of plants, the corolla whereof consists of a ringent, single petal: the tube is cylindrical, and twice the length of the cup: the limb is divided into five plane segments: the fruit is a roundish bilocular capsule; the seed is a single bilocular nut.

VOLLEY, a military salute, made by discharging a great number of fire-arms at the same time.

VOLO, in roman antiquity, an appellation given to the slaves, who, during the second punic war, offered themselves to serve in the army.

VOLT, or **VOLTE**, in the manege, a round or circular tread; and hence, by the phrase, to make volts, is understood a gate of two treads, made by a horse going sideways round a center, in such a manner, that these two treads make parallel tracts, one larger made by the fore feet, and another smaller made by the hind feet, the croup approaching towards the center, and the shoulders bearing outwards. Sometimes the volt is of one tread; as when a horse makes volts in corvets, and in caprioles, so that the haunches follow the shoulders, and move forwards on the same tread. In general, the way and tract of a volt is made sometimes round, sometimes oval, and sometimes square, of four straight lines; so that these treads, whether round or square, inclose a terrain, or manege ground, the middle of which is sometimes distinguished by a pillar, or else by an imaginary center, which is there supposed in order to regulate the distances and the justness of the volt.

A demi-volt is a demi-round of one or

two treads, made by the horse at one of the corners of the volt, or else at the end of the line of the passade; so that being near the end of this line, or one of the corners of the volt, he changes hands, to return by a semi-circle.

A renversed volt, is a tract of two treads, made by the horse, with his head to the center, and his croup out; so that he goes side-ways upon a walk, trot, or gallop, and traces out a small circumference with his shoulders, and a larger one with his croup.

This different situation of the shoulders and the croup, with respect to the center, gave this volt the name of renversed, as being opposite in situation to the former.

VOLTA, a river of Guinea, in Africa, which running from north to south, falls into the ocean east of Acra.

VOLTERRA, a town of Tuscany, in Italy, twenty-three miles south of Florence.

VOLTURARA, a town of the kingdom of Naples, fifty-five miles north-east of the city of Naples.

VOLTURNO, a river of the kingdom of Naples, which, rising in the province of Molise, runs by Capua, and falls into the gulph of Gaieta.

VOLUBILIS, in botany, a name used by Dillenius for a species of convolvulus. See the article **CONVOLVULUS**.

VOLUME, *volumen*, in matters of literature, a book, or writing, of a just bulk to be bound by itself. The name is derived from the Latin *volvere*, to roll up; the antient manner of making up books being in rolls of bark or parchment. See the articles **BOOK**, **TOME**, &c.

Foreign philosophers use the phrase, volume of a body, for its bulk, or the space inclosed within its superficies. See the articles **BODY**, **SOLID**, &c.

VOLUMUS, in law, the first word of a clause in one species of the king's writs of protection and letters-patent.

VOLUNT, *voluntas*, in law, is when a tenant holds lands, &c. at the will of the lessor, or lord of the manor. See the article **TENURE**.

VOLUNTARY, in music, a piece played by a musician extempore, according to his fancy. This is often used before he begins to set himself to play any particular composition, to try the instrument, and to lead him into the key of the piece he intends to perform.

VOLUNTËRS, in the military art, persons who of their own accord, and at their

their own expence, serve in the army.

VOLUTA, in natural history, a genus of univalve shells, with an oblong mouth, a clavicle sometimes erect and sometimes depressed, and sometimes coronated at top. To this genus belong the admiral shells, tiger shells, &c. See the articles **ADMIRAL** and **TIGER**.

VOLUTE, *voluta*, in architecture, a kind of spiral scroll, used in the ionic and composite capital, whereof it makes the principal characteristic and ornament. See **IONIC** and **COMPOSITE**.

There are several diversities practised in the volute. In some, the list or edge, throughout all the circumvolutions, is in the same line or plane; such are the antique ionic volutes, and those of Vignola. In others, the spires or circumvolutions fall back; in others, project, and stand out. Again, in some, the circumvolutions are oval, in others, the canal of one circumvolution is detached from the list of another by a vacuity or aperture. In others, the rim is parallel to the abacus, and springs out from behind the flower thereof. In others, it seems to spring out of the vase from behind the ovum, and rises to the abacus, as in most of the fine composite capitals.

VOLVULA, in natural history, the name of an extraneous fossil body, nearly allied to the entrochus, being composed of the same substance, and being like that of a cylindric column, made up of several joints; the commissures of the joints are, however, much less visible in the volvula than in the entrochi, and they are not striated, as in the entrochus, from the center to the circumference. See the article **ENTROCHUS**.

VOLVULUS, in medicine, a name which some authors give to the iliac passion, by others called chordapfus, and by others *miserere mei*. See the article **ILIAC**.

VOMER, in anatomy, a bone of the upper jaw, situated between the bones of the palate and the sphenoidal bone, being also joined to the process of the ethmoides, and part of the lower jaw, and having its forepart, which is spongy, continued to the middle cartilage of the nose, and making, in conjunction with it, the septum nasi. See **NOSE** and **MAXILLA**.

VOMICA, in medicine, is commonly taken for a suppurated imposthume, or an abscess with a suppuration. See **ABSCESS**, &c. The vomica pulmonum is a latent disease of the lungs, which often deceives under a shew of health. What goes by

this name, is a small abscess seated in some part of the lungs, and straitly inclosed within a bag or membrane. This disorder is most incident to those who are afflicted with a tabes, or labour under an anastomosis or rupture of a vein in the lungs. In this disease, the breath smells ill long before the vomica breaks; sometimes blood comes up with coughing, the body is perfectly dull and heavy, and the cough very long and troublesome, and sometimes followed by an expectation of the vomica, in which case the patient is seized with no small fever, succeeded by bloody spit, and a vast perturbation of body; the consequence of which circumstance may possibly be a recovery to a good state of health. It has often happened that the vomica, by a sudden rupture, has discharged itself into the heart, and occasioned sudden and unexpected death. See **PHTHISIS**.

Nux VOMICA, in pharmacy, a flat, compressed round fruit, of the breadth of a shilling, or somewhat more, and of about the thickness of a crown-piece. Its surface is not much wrinkled or corrugated, but sometimes marked with tolerably regular fibres, running from the center to the circumference; it is somewhat downy or woolly, and of an extreme firm texture, tough like horn, and of a pale greyish-brown colour. It has a sort of umbilicus on each side of the center, and is more prominent on one side, and more depressed on the other; it is very difficultly cut or broken, and leaves a smooth and glossy surface behind the knife; it is moderately heavy, and is of a somewhat paler colour within than on the surface; it has no smell, but an extremely bitter taste. We have it only from the East-Indies, whence it is brought with another drug called the *lignum colubrinum*. It was held by many to be the root of a plant, and by others to be a fungus or an excrement. But it is in reality the nucleus of a fruit of an East-Indian tree, the wood of which is the *lignum colubrinum* of the shops. See **COLUBRINUM**. Some have prescribed small doses of the *nux vomica* as a specific against a gonorrhoea, and others against quarant agues. But we have so many good and safe medicines for all these purposes, that there seems no occasion for our having recourse to such as these, which shew to many signs of mischief.

There is another species of the *nux vomica*, described by Breynius, under the name

name of modira caniram, and nux vomica officinarum vera. Commelin determines this tree, not the former, to afford the true nux vomica, and the true lignum colubrimum of the shops; and Herman, on the other hand, is as positive as to the other. There is also another sort of nux vomica, which is much smaller than the former, very like them, and has all their qualities: it is the fruit of another species of the same genus, which is the tree that furnishes the true officinal wood.

VOMIT, or EMETIC, in pharmacy. See the article **EMETIC**.

VOMITING, in medicine, a retrograde spasmodic motion of the muscular fibres of the oesophagus, stomach, and intestines, attended with strong convulsions of the muscles of the abdomen and diaphragm, which, when gentle, create a nausea; when violent, a vomiting. These convulsive disorders proceed from the immoderate quantity, or acrimony of the food; from poisons; from some injury of the brain, as a wound, contusion, compression, or inflammation of that part; from an inflammation of the diaphragm, stomach, intestines, spleen, liver, kidneys, pancreas, or mesentery; from an irritation of the gula; from a disorderly motion of the spirits, by unaccustomed agitations in a coach, ship, or otherwise, or from the idea of something nauseous.

The two principal curative indications to be observed are, first, to quiet and compose the convulsive and unruly motion of the stomach; and, secondly, to oppose and subdue the material causes of the disorder.

The first intention is answered by corroborating and antispasmodic medicines, such as saffron and castor, with the testaceous powders, as coral, crabs-claws, and oyster-shells; powders composed of cinnamon, the leaves of mint, nutmeg, orange-peel, calamus aromaticus, and other such simples, are also of great service. And if anodynes are found necessary, the storax pill, or Sydenham's laudanum, are to be given.

While these medicines are taken internally, there may also be applied outwardly, to the region of the stomach, such things as have power to repress its disorderly motions; of this kind are the oil of mint, nutmeg, and the like, with balsam of Peru: these oils may be reduced to a proper consistence, with this balsam, for the spreading on leather, and laying on for some time. Hungary-water, and

other the like spirits, are of great use also, rubbed on with the hand; and to these may be added yeast, and the strongest wine-vinegar applied hot to the part. Finally, an excellent application is balsam of Peru alone, reduced to the consistence of a cataplasm, with crumb of bread. The methods to be used to remove the material causes of the vomiting, are next to be considered: if it be of the pituitous kind, and owing to crudities in the primæ viæ, and a viscid mucus sticking to them, it is best cured by an emetic: if the vomiting of itself be found not sufficient to carry off the fœces which occasion it, and the patient continues, after the fits of vomiting, afflicted with a nausea and heart-burn; in this case, a large quantity of warm water, with a little butter, may serve the purpose; or if this be found insufficient, a dose of ipecacuanha is to be given.

VOMITINGS in *Infants*. See **INFANT**.

VOMITING of blood, *vomitus cruentus*, a very dangerous kind of hæmorrhage, consisting in a bringing up by vomit of pure and unmixed blood from the stomach, and being a method, used by nature to throw off a portion of the blood, which molests the whole in the vena porta, and by that means to facilitate the circulation of the rest of the mass. See the article **HÆMORRHAGE**.

This distemper sometimes arises from internal causes, and is regularly periodical, observing the stated times of the eruptions of the menses, or other natural discharges; sometimes it arises from accidents, such as the giving of violent purging or emetic medicines, or corrosive ones. Among the preceding signs of this disorder, are to be reckoned a sensation of straitness and anxiety in the præcordia, with tension, and involuntary sighs; with a nausea or sickness of the stomach, and a straining to vomit; which is more violent than in vomiting on any other occasion; after this the blood is thrown up pure, and the vomiting then ceases, till, after a plain sensation of more blood being collected in the stomach, the efforts to discharge it in the same manner are again renewed. The quicker the blood is thrown up, after its being discharged into the stomach, the more fluid and more florid it appears; the longer it is detained there, the blacker and thicker it appears. A vomiting of blood is but an uncommon disorder. It more frequently attacks women than men; among the female

female sex it is principally seen in those whom the menses have left too early in life, or who have had violent suppressions of them for a long time. In men, this distemper seldom seizes any but those who have been used to periodical discharges from the hæmorrhoidal vessels, and who have had them suddenly stopped; and they are then usually first attacked with violent pains in the left hypochondrium. People of scorbutic habits, and such as have had quartan agues of long standing, have been sometimes thus affected. And, beside these natural causes, people of all ages and sexes may vomit blood, from external injuries.

A vomiting of blood is ever a dangerous disorder; for though the quantity of blood thrown up is seldom so great as to occasion immediate death, yet it generally degenerates into a tabes in men, and into a cachectic habit in women. It is less dangerous to young women, than to any other persons; and when it is periodical, especially when it observes the times of the menstrual discharges, is much less dangerous than under any other circumstances. During the paroxysm, the proper medicines are powders of nitre, cinnabar, and the absorbent substances, such as crab's-eyes, or the like, and afterwards bleeding, cupping, and gentle purges; and diaphoretics are to be given for some time.

VOORN, one of the islands of Holland, bounded by the river Maes, which divides it from the continent and the island of Lilemunde, on the north; by the sea called the Bies-bosch, on the east; by another branch of the Maes which divides it from the islands of Goree and Overflackee, on the south; and by the German-sea on the west; being about twenty-four miles long, and five broad.

VOPISCUS, a latin term used, in respect of twins in the womb, for that which comes to the perfect birth; the other being before excluded abortive.

VORTEX, in meteorology, a whirlwind, or sudden, rapid, and violent motion of the air in gyres, or circles.

Vortex is also used for an eddy or whirlpool; or a body of water, in certain seas or rivers, which runs rapidly around, forming a sort of cavity in the middle.

VORTEX, in the cartesian philosophy, is a system or collection of particles of matter moving the same way, and round the same axis. See **CARTESIAN**.

Such vortices are the grand machines,

whereby those philosophers solve most of the motions and other phænomena of the heavenly bodies. Accordingly, the doctrine of these vortices makes a great part of the cartesian philosophy.

But this doctrine of vortices is at best merely hypothetical. It does not pretend to shew by what laws and means the celestial motions are really effected, so much as by what means they possibly might, in case it should have to pleased the Creator. But we have another principle which accounts for the same phænomena, as well, nay, better, than that of vortices; and which we plainly find has an actual existence in the nature of things; and this is gravity, or the weight of bodies. See the articles **GRAVITATION**, **GRAVITY**, &c.

The vortices then should be cast out of philosophy, were it only that two different adequate causes of the same phænomena are inconsistent. See the article **NEWTONIAN PHILOSOPHY**.

But we have other objections against it. For, 1. If the bodies of the planets and comets be carried round the sun in vortices, the bodies of the parts of the vortex immediately investing them, must move with the same velocity, and in the same direction; and besides, must have the same density, or the same vis inertæ. But it is evident that the planets and comets move in the very same parts of the heavens, with different velocity and in different directions. It follows, therefore, that these parts of the vortex must revolve at the same time in different directions, and with different velocities; since one velocity and direction will be required for the passage of the planets, and another for that of comets. 2. If it were granted that several vortices were contained in the same space, do penetrate each other, and revolve with divers motions; since those motions must be conformable to those of the bodies which are perfectly regular, and performed in conic sections; it may be asked, how they should have been preserved entire so many ages, and not disturbed nor confounded by the adverse actions and shocks of so much matter as they meet withal? 3. The number of comets is very great, and their motions perfectly regular, observing the same laws with the planets, and moving in conical orbits which are exceedingly excentric. Accordingly they move every way, and to all parts of the heavens, freely pervading the planetary regions,

regions, and going frequently contrary to the order of the signs; which would be impossible, unless these vortices were away. See the article COMET.

4. If the planets move round the sun in vortices, those parts of vortices next the planets, we have already observed, would be equally dense with the planets themselves, consequently, the vortical matter, contiguous to the perimeter of the earth's orbit, would be as dense as the earth itself; and that between the orbits of the earth and saturn, it must be as dense or denser. For a vortex cannot maintain itself, unless the more dense parts be in the center, and the less dense towards the circumference; and, since the periodical times of the planets are in a sesquialterate ratio of their distances from the sun, the parts of the vortex must be in the same ratio. Whence it follows, that the centrifugal force of the parts will be reciprocally as the squares of the distances. Such, therefore, as are at a greater distance from the center, will endeavour to recede therefrom with the less force. Accordingly, if they be less dense, they must give way to the greater force, whereby the parts nearer the center endeavour to rise. Thus the more dense will rise, and the less dense descend; and thus there will be a change of places, till the whole fluid matter of the vortex be so adjusted, as it may rest in æquilibrium. See the article PLANET, &c.

Thus will the greatest part of the vortex, without the earth's orbit, have a degree of density and inactivity, not less than that of the earth itself. Whence the comets must meet with a very great resistance, contrary to all appearances. See the article RESISTANCE.

VOTE, the suffrage or resolve of each of the members of an assembly, where any affair is to be carried by a majority; but more particularly used for the resolves of the members of either house of parliament. See PARLIAMENT.

VOTIVE MEDALS, those on which are expressed the vows of the people for the emperors or empresses. See MEDAL.

VOUCHER, in law, is a person called into court, to make good another's warranty, who is either to defend the right against the demandant, or yield him other lands to the value, &c. See WARRANTY.

This extends to lands or tenements of freehold or inheritance, but not to any thing personal or mixed.

Here he that voucheth is called the vouch-

er, and the person that is vouched is called the vouchee. There is also a foreign voucher when the tenant impleaded in a particular jurisdiction, voucheth one to warranty in some other county, out of the jurisdiction of that court, and prays that he may be summoned.

VOUCHER also signifies a receipt or acquittance in cases of account.

VOUTENAI, a town of France, in the dutchy of Burgundy, twenty miles south-east of Auxerre.

VOW, a solemn and religious promise, or oath. See the article OATH.

The use of vows is found in most religions. They make up a considerable part of the pagan worship, being made either in consequence of some deliverance, under some pressing necessity, or for the success of some enterprize. Among the Jews, all vows were to be voluntary, and made by persons wholly in their own power; and if such person made a vow, in any thing lawful and possible, he was obliged to fulfil it. If he appointed no particular time for accomplishing his vow, he was bound to do it instantly, lest by delay he should prove less able, or be unwilling, to execute his promise. Among the romanists, a person is constituted a religious by taking three vows, that of poverty, chastity, and obedience.

VOWS, *vota*, among the Romans, signified sacrifices, offerings, presents and prayers made for the Cæsars and emperors, particularly for their prosperity and the continuance of their empire. These were at first made every five years, then every fifteen, and afterwards every twenty, and were called quinquennialia, decennialia, and vincennialia.

VOWEL, *vocalis*, in grammar, a letter which affords a complete sound of itself, or a letter so simple as only to need a bare opening of the mouth to make it heard, and to form a distinct voice. See the article LETTER.

The vowels are six in number, *viz.* A, E, I, O, U, Y, and are called vowels in contradistinction to certain other letters, which, depending on a particular application of some part of the mouth, as the teeth, lips or palate, can make no perfect sound without an opening of the mouth, that is, without the addition of a vowel, and are therefore called consonants. See the article CONSONANT.

Grammarians reckon also eight semi-vowels, *viz.* F, H, L, M, N, R, S, Z, so denominated because they approach

nearer a vowel in the pronunciation. Of these semi-vowels four, *viz.* L, M, N, R, are called liquid. See LIQUID.

VOX, or VOCEM NON HABERE, in law, a phrase used by Bracton to signify an infamous person.

UPHOLSTER, UPHOLSTERER, or UPHOLDER, a tradesman that makes beds, and all sorts of furniture thereunto belonging, &c.

Upholsters, in carrying on their trade, are to stuff their beds with one sort of dry pulled feathers, and not mix any other therewith, on pain of forfeiting the same, or the value; and their stuffing for quilts is to be clean wool, or flocks, without using any horse-hair, &c. therein, under the like pain. See BED, &c.

UPLAND, denotes high ground, or, as some call it, terra firma, by which it stands opposed to such as is moorish, marshy, or low.

The uplands lie either on the tops of hills, or on their sides, or on the slopes of rising grounds. They sometimes have a sandy soil, sometimes a rocky, gravelly, or loamy one; and sometimes they consist of a tough clay, or a black mould; they are used by the farmers, either for grazing or corn, as they happen to be more moist or more dry; and this difference depends upon their situation and nature. Those lands which lie flat upon the tops of hills, are usually the driest, and those which form the slopes or sides, are generally the moistest, because of the wet that is continually oozing through them. The upland meadows have some disadvantage, as they often need mending or feeding, which those that lie lower do not; but then they make amends for this in their hay, which is always much finer and sweeter than that of the low lands.

UPLAND, a province of Sweden, bounded by the province of Gethricia on the north-west, by the Baltic-sea on the north-east and south-east, and by Sunderland and Westmania on the south and west.

UPPINGHAM, a market-town of England, in the county of Rutland, situated six miles south of Okeham.

UPRIGHT, in architecture, a representation or draught of the front of a building, called also an elevation or orthography. See the article ELEVATION, &c.

UPRIGHT, in heraldry, is used in respect of shell fishes, as crevices, &c. when standing erect in a coat. Inasmuch as they want fins, they cannot, according to Guillim, be properly said to be hauriant, that

being a term appropriated to scaly fishes. UPSAL, a city once the capital of the province of Uppland, and of all Sweden, being the only archbishop's see in Scandinavia, and an university, situated in east long. 17° 30', north lat. 60°.

UPTON, a market-town of Worcestershire, nine miles south of Worcester.

UPUPA, the *HOPOE*, in ornithology, a genus of birds with the beak arcuated, convex, compressed and equal, and having a furrow running along each side of it; there is a crest on the head, which is capable of folding back. This is an extremely singular bird, but it is so thick covered with feathers, that it appears large in proportion to its weight; the head is large, and ornamented with an elegant crest; the eyes are small, but very bright and piercing; the tail is between four and five fingers breadth long, in the middle whereof there is an elegant spot of white, of the figure of a new moon; the back is variegated with black and white in an elegant manner; the legs are short, and the outer toe is connected to the middle one some part of the way down, without the help of a membrane.

URACHUS, in anatomy, a membranous canal in the foetus of quadrupeds in general, of a pyramidal figure, extended immediately from the fundus of the bladder to the navel, and after passing through this, it is by degrees enlarged, and makes its way into the allantois at right-angles each way, or nearly so, and conveys the urine from the bladder into the cavity of this membrane. In the human foetus, the whole urachus is not pervious, or very rarely so; it is usually found solid, in form of a ligament. It scarce appears probable, therefore, that it serves the office of discharging the urine from the bladder in this as in the former case, and especially as there is no such membrane as the allantois in the human body, nor any cavity formed for the reception of so great a quantity of fluid. See the articles FOETUS, ALLANTOIS, &c.

URANBURG, or URANIBURG, a castle of Denmark, situated on the little island of Huen, in the Sound, sixteen miles north-east of Copenhagen. Here was the celebrated observatory built by that noble Dane Tycho Brahe, and furnished with instruments for observing the course and motions of the heavenly bodies.

URANOSCOPUS, the STAR-GAZER, in ichthyology, a species of trachinus, with nume-

numerous cirri on the under jaw. See the article *TRACHINUS*.

This fish is of an extremely singular figure; the body is rounded, a little depressed; the back broad, the sides prominent, and the belly somewhat flattened; the head is large and depressed; the mouth divided, as it were, into three spines under the tongue, and the lower jaw turning upwards; the eyes are large and stand near one another, not on the sides, but on the top of the head, so that the fish naturally looks straight upward; the iris is of a gold-yellow, the pupil is of a bluish-black, the nostrils have each a double aperture, and are placed at some distance under the eyes; the whole head, and the coverings of the gills, are beset with a great number of rough and sharp tubercles; there are two back fins, the first has three prickly rays, the second has fourteen; the pectoral fins have each sixteen rays, the ventral ones have each five, and the pinna ani has thirteen. See plate CCXCVI. fig. 6.

URBINO, a province of Italy, in the pope's territory, bounded by Romania and the gulph of Venice on the north and east, by the marquissate of Ancona on the south, and by Tuscany on the west, being seventy miles long, and from twenty to fifty broad.

Urbino is also the capital of this province.

URDE', or **URDE'E**, in heraldry. A cross urde seems to be the same with what we otherwise call chleche, or chlechée. See the article *CHLECHE*.

UREDO, the blasting or blighting of trees or herbs. See the article *BLIGHT*.

It is sometimes used by physicians for an itching or burning of the skin.

URENA, in botany, a genus of the monadelphia-polyandria class of plants, the corolla whereof consists of five oblong, obtuse, connated petals, broader than the apex, and narrower at the base; the fruit is a round echinated capsule, with five angles, consisting of five cells, and made up of five valves; the seeds are solitary, roundish, and compressed.

URETERS, *ουρητηρες*, in anatomy, two membranaceous tubes or pipes, nearly cylindric in figure, and of about the thickness of a quill: but their diameter is very uncertain. They arise from the kidneys, one from each, and terminate in the urinary bladder. See *KIDNEY*.

At their origin in the kidneys they are expanded into the form of a funnel, and

this expansion makes the pelvis of the kidneys. See the article *PELVIS*.

At their termination, which is in the hinder and lower part of the bladder, they pass obliquely in between its membranes, and open into the bladder by very narrow orifices, and can admit nothing into them from the bladder. They are not straight, but somewhat bent, so as to resemble the letter S; their substance is membranaceous, and they are composed of three coats; the first a common one, from the peritonæum; the second a thin muscular one; and the third a nervous one, covered with a lubricous humour; and in this there are sometimes discovered glands. The blood-vessels and nerves come from the adjacent parts. The use of the ureters is to receive the urine secreted in the kidneys from the pelvis, and to carry it to the urinary bladder. When these are obstructed, a suppression of urine is the consequence; for there is no other way for the urine to get into the bladder but through them. They are often found of an unnatural size, owing to stones concentered from among the urine. See the articles *BLADDER*, *URINE*, *DYSURY*, &c.

URETHRA, *ουρηθρα*, in anatomy, a membranaceous tube or canal, of a cylindric figure, arising from the neck of the bladder, and continued to the pudendum, serving to discharge or carry off the urine and semen.

The length of the urethra is very different in both sexes. In man it is twelve or thirteen inches, from the neck of the bladder to the extremity of the glans. It is situated in a kind of narrow furrow, formed between the corpora cavernosa, in the bottom or lower part of the penis. It does not run perfectly straight, but is bent in a very singular manner. Its cavity is as large as that of a goose-quill. It is composed of two robust membranes, an exterior and interior; their substance is thin and tough, and between them there is a spongy or cavernous matter, in which some authors pretend to have discovered glands, but this is uncertain. The bulb of the urethra is that part of it next to the prostates; it is much thicker than the rest of the tube, and is about an inch long, and in some measure resembles a walnut. It is of a thick and spongy texture. The interior surface of the urethra, is full of roundish and oblong foraminulæ and furrows, out

of which there may often be pressed a thick viscous fluid, the use of which is to lubricate the urethra, and to defend it from the acrimony of the urine. See the articles *PENIS*, *GLANS*, &c.

The urethra or urinary passage in women, usually called *meatus urinarius*, is situated straight under the clitoris, and shews itself by a little eminence. Its length is about two fingers breadth; its diameter is greater than that in man, but somewhat narrower at the end than elsewhere. It is capable of great dilatation. There are in it certain little ducts, which convey to its inner surface a mucous humour, for lubricating and defending it from the acrimony of the urine, like those in man; but their origin is uncertain.

URGEL, a town of Spain, in the province of Catalonia, capital of the territory of Urgel, situated on the river Segra, seventy-five miles north of Barcelona.

URI, one of the cantons of Switzerland; bounded by that of Switz, on the north; by Glaris and the Grisons, on the east; by Unterwald, on the south; and by the Canton of Bern, on the west.

URIM and **THUMMIM**, among the ancient Hebrews, a certain oracular manner of consulting God, which was done by the high-priest dressed in his robes, and having on his pectoral, or breast-plate. Various have been the sentiments of commentators concerning the urim and thummim. Josephus, and several others, maintain that it meant the precious stones set in the high-priest's breast-plate, which by some extraordinary lustre made known the will of God to those who consulted him. Spencer believes that the urim and thummim were two little golden figures shut up in the pectoral as in a purse, which gave responses with an articulate voice. In short, there are as many opinions concerning the urim and thummim as there are particular authors that wrote about them. The safest opinion, according to Broughton, seems to be, that the words urim and thummim signify some divine virtue and power annexed to the breast-plate of the high-priest, by which an oraculous answer was obtained from God when he was consulted by the high-priest; and that this was called urim and thummim to express the clearness and perfection which these oracular answers always carried with

them; for urim signifies light, and thummim perfection; these answers not being imperfect and ambiguous, like the heathen oracles, but clear and evident. The use made of the urim and thummim was to consult God in difficult cases relating to the whole state of Israel; and sometimes in cases relating to the king, the sanhedrim, the general of the army, or some other great personage.

URINAL, in medicine, a vessel fit to receive and hold urine, and used accordingly for the convenience of sick persons. It is usually of glass and crooked; and sometimes it is filled with milk to assuage the pain of the gravel. See the articles *URINE*, *STONE*, and *UROCRITERIUM*.

URINAL, in chemistry, is an oblong, glass-vessel, closed for making solutions, and so called from its resemblance to the glasses in which urine is set to settle for the inspection of the physician.

URINARIA PISTULA, or **URINARY PASSAGE**, the same with urethra. See the article *URETHRA*.

URINE, *urina*, a serous and saline fluid, of a citron-colour, separated from the blood, and carried by the emulgent arteries to the kidneys, from whence it descends to the bladder by the ureters, and is, from time to time, emitted thence by the canal of the urethra. See the articles *BLOOD*, *ARTERY*, &c.

The urine is therefore the serosity of the blood, but not pure, for it is loaded with saline, sulphureous, and terrestrial particles, of which it is the menstruum and the vehicle. The sides of the bladder are guarded by a mucilaginous fluid, excreted by the glands which are between its coats, by which means the urinous salts make the less impression upon it. This fluid forms the glair which falls to the bottom of the vessel when a person is afflicted with the stone. It is observable, that there are three sorts of substances differently placed in the urine, *viz.* the nubecula, the encœrema, and the hypostasis. The nubecula is a sort of a pellicle which swims on the top of the urine, and consists of the saline and fibrous particles of the blood mixed with the serosity. When it is exposed to the fire it changes to a crustaceous substance. The encœrema, or suspension, is a white, light, spongy matter which swims in the middle of the urine, consisting of particles of a different nature. The hypostasis, or sediment, is a saline, sulphureous,

phureous, and terrestrial matter, which precipitates to the bottom of the urine. See the article *NUBECULA*, &c.

The urine of four-footed beasts is troubled and muddy, that of men is more clear and limpid. In infants it is more pale and thick than that of middle-aged persons. In the very old it is more clear, thin, and has not so much colour. In hot, bilious constitutions, it is more of a saffron colour: in the cold and pituitous, pale. Wine drinkers have it of a higher colour, and more thick: in those that use much exercise it is little and red: in the idle it is pale with a large sediment. After meals it is copious, insipid, light, raw, and without smell: and after long fasting, it is of a higher colour, acrid, and little. Those that sweat much make little water, which is more muddy and yellow. Diseases cause a remarkable change in the urine. Light, thin, watry urine, shews the person to be afflicted with internal spasms, the hysseric passion, the hypochondriac pains, the cardialgia, the stone or gravel, or convulsive colic. In diseases of the head, such as the vertigo, phrensy, madness, melancholy, and epilepsy, the urine is always thin and light. It is likewise the same in the more grievous afflictions of the nerves from poison or worms. This state of the urine not only happens in the fits, but some days before and after. See the articles *SPASM*, *HYSSERIC PASSION*, &c.

When the urine is thin, aqueous, and always white, it presages danger in obstinate diseases: if it is copious in the state of fevers, and before the crisis, it portends a phrensy. In internal inflammations it is always dangerous, the more copious the worse. After a dysentery, a spotted fever, or the small-pox, this kind of urine is common. In a cachexy, leucophlegmatia, enormous bleedings in the beginning of an anasarca, in the green-sickness, in a suppression of the menses, the urine is crude, turbid, pale, greenish, or of a light citron-colour, and copious. In all preternatural febrile heats, the urine is yellow or red, and in small quantities: such kind of urine as is more or less red, or thin and light, or thick and heavy, is usually in intermitting and continual fevers. In the fit, that is, in its exacerbation or state, the urine is thin, clear, and without sediment. In an ardent and bilious fever, the urine is generally pellucid, but of a flame-colour. In intermitting after the fit, and on the well

day, it is thick, and deposits a sediment. If this happens in continual fevers after the crisis, it shews the fever to be ended. If the sediment is of a rosy or purple-colour, it shews the blood is in fault, as is evident in continual fevers. When it is intensely yellow, it discovers that the bile is in fault. When it is brown or black, there is plenty of black bile, as in a scorbutic or miliary fever, and in quartans of a dangerous nature. When it is very plentiful, and full of viscid and crude humours, in replete, obese, and spongy bodies, it shews the obstinacy of an intermitting fever. See the articles *DISEASE*, *FEVER*, &c.

As it is a good sign when the urine is thick and deposits a sediment, in fevers; so, on the contrary, if there is no sediment in intermitting fevers, but the urine continues clear, and lets fall no sediment in the cold fit, it is a very bad sign. If, after the fit, it has no sediment, but is pellucid, it is a very bad omen. In all inflammatory fevers, if the urine is clear and of a purple colour, or brown, and of a deep colour, frothy and without sediment, it is a bad sign. Likewise, it is always observed, that in a continual fever, if the urine is turbid, and does not grow clear either by the fire or rest, nor deposits a sediment, it is a very dangerous presage; it is likewise very bad, when in continual fevers, it is thick on the first days, and in the remainder, especially the critical days, it is thin and without sediment. In the decline of catarrhal fevers, and in the small pox and measles, if the urine was clear and aqueous, but is now thick and high coloured, with a sediment, it is a certain sign that the disease remits. See the article *INTERMITTING FEVERS*.

In consumptions, and all other violent and chronic diseases, if the urine is thick, high-coloured, and a dark red, with a copious sediment, and a fatness swims upon the urine, and adheres to the sides of the urinal, the body at the same time wasting away, it is a sign of a slow hectic fever, which is generally fatal. The like danger is threatened when in dropical persons the urine is like that of hectics, for its scarcity is a sign that the lymph is extravasated into some cavity or porous substance; and if the colour is of a deep red, with a gross sediment, it shews the intestine motion and heat dissolves the blood, that the liver is obstructed; whence a bilious sordes is separated.

separated therefrom. See the article CONSUMPTION, &c.

In chronical diseases, without a fever, when the urine is thick, high-coloured, and of a reddish-brown, as well as heavy, as in the confirmed scurvy, gout, scorbutic palsy, and in extreme old age, as also in a nephritic passion, when the pains cease, as well as in the yellow and black jaundice, it shews a plenty of saline and sulphureous excrementitious parts, wherewith the blood and humours abound, and are not duly secreted therefrom, by reason of an obstruction of the liver. Willis has observed, that patients dying of the scurvy have had their livers almost without blood, and like a cow's udder. In some the gall-bladder was either empty or full of stones, or very bitter filth.

When the urine is thick, of a deep colour, and dyed-linen yellow, it is a sign that the bile is obstructed, or the duct constricted with a spasm, whence the passage of the bile into the duodenum is hindered; whence it regurgitates by the lymphatic vessels into the blood and lymph, and produces a jaundice. When the colour is of a brownish-black, it is a sign of the black jaundice, which proceeds from an impeded secretion of the bile in the liver. See JAUNDICE.

Sometimes the urine is imbuted with an oily matter, and is made without noise, there are various colours on the surface, chiefly bluish, and it adheres so strongly to the sides of the urinal, that it cannot be washed off with a lixivious liquor. This is a sign of the colliquation of the fat: it shews a consumption, an atrophy, and an hectic. Sometimes it is observable in fevers, and the oleous matter is more plentiful in proportion to the fatness of the body. See ATROPHY, &c.

When the urine abounds too much with a tartarious matter, which is known by its adhering to the sides of the chamber-pot, it is a sign of a disposition to the gravel and stone. When there is a small sand in the urine, it shews those disorders to be actually present. Sometimes shining yellow crystals are seen on the sides of the pot, which is a sign of arthritic or rheumatic pains. When the urine is bloody or whitish, from a mixture of pus loaded with a glutinous, thick, tenacious matter, of a bad smell, which sinks to the bottom, and does not dissolve by the agitation of the vessel, it is a certain sign of an ulcer in the kid-

neys or bladder. Sometimes, in the stone and ulcer of the bladder, it is like the white of an egg, and so tenacious that it will not divide, but fall from the vessel at once. See the article STONE.

In a chronical and malignant gonorrhœa, not only the prostaticæ, but often the bladder is ulcerated; whence a thick and turbid urine, with a copious sediment, which when thrown on the coals has a most fetid smell. Likewise, in the stone in the bladder, this, or its sphincter, is so eroded that the urine is thick and branny, with small caruncles and filaments, which the vulgar take for worms. In the strangury there is a frequent stimulus to make water, which is little and muddy, sharp and salt, with filaments; and then there is some spasmodic disorder affects the sphincter. If blood is mixed with the urine, like the washings of flesh or red-wine, but falls to the bottom of a purple colour, it proceeds from the kidneys; but if it be of a brownish-black, it comes from the veins of the bladder.

Incontinence of URINE. This is a term used by medical writers to express an involuntary excretion of this liquor, whether it be incessantly, or in larger quantities at different intervals. This is of two kinds: in the one it is only in the night, in the time of sleep; and this arises merely from carelessness, and a bad habit: in the other, it depends on a paralytic affection of the sphincter of the bladder; and in this case it drops away continually from the patient; and this is therefore called by some a stillicidium. Authors also divide an incontinence of urine into the idiopathic and symptomatic: the idiopathic is a disease in itself, and depends upon the preceding causes; the symptomatic happens to different persons on different occasions, as a symptom of other complaints. It is common to dying persons; it is also very frequent to women who are big with child, and sometimes happens from violent sneezing, coughing, or laughing. The voiding of the urine involuntarily, and in the sleep, in infants, is not to be accounted a disease; but when this custom continues with them as they grow up, from idleness, or ill habit, it is at length to be considered as a disease, as they are by no means able to help it. Women who have suffered much in childbirth are often subject to an incontinence of urine afterwards, especially persons who have had their first child at an advanced age. People in years, who are

subject

subject to paralytic complaints, are also often afflicted with this troublesome complaint; and many who have been cut for the stone by persons not sufficiently skilled in the operation. Persons subject to the piles also sometimes fall into it, from the suppressions of their usual discharges, and sometimes from the tumours becoming fistulous, and reaching to the neck of the bladder. Imposthumes of the bladder will also occasion it, and violent external injuries.

An incontinence of urine, which happens only in the night, and is merely caused by a bad habit, and not of long standing, usually admits of a cure; but the stillicidioms of urine, from paralytic disorders of the sphincter of the bladder, are very rarely cured, especially when they have been fixed some time upon the person. The involuntary voiding of the urine in the night, in children, is to be cured, in a great measure, with punishment for the neglect, and by denying them much liquids after dinner-time; by a proper diet; the avoiding all diuretics, and the making water immediately before going to bed; and when it has gone so far, that the tone of the parts is injured, the usual strengthening medicines are to be given, as in the following cases. When the incontinence of urine is occasioned by a paralytic weakness of the sphincter, nervous and strengthening medicines are the proper method of curing; in this case, mastic, amber, nutmeg, and cinnabar, are found to be of great service, and pills or powders compounded of them, are an excellent general remedy to be given in small doses, two or three times a day. Externally, it is very proper to use by way of fomentation, decoctions of rosemary, sage, serpyllum, marjoram, and the like warm herbs in red wine. When the disease is occasioned by an imposthume or ulcer in the neck of the bladder, balsamics are to be given, as mastic, gum-juniper, and boiled turpentine; but when it is owing to injuries received in child-birth, the manual operation of the surgeon is usually to be preferred to all internal medicines.

Bloody URINE, or voiding blood by urine. See the article *HÆMORRHAGE of the urinary passages*.

Difficulty, or suppression, of URINE. See the articles *DYSURY*, *ISCHURY*, &c.

When the urine of children is suppressed by viscid humours which obstruct the kidneys, or from the relaxed tone of the

bladder, or from spasmodic contractions, producing pains, convulsions, and other disorders, you may give them half a scruple of some neutral salt, such as tartar vitriolate, arcanum duplicatum, and the like; or the same quantity of the seeds (Ray says the flowers) of muscus clavellatus, lycopodium, or club-moss, in parsley-water; it being diuretic and antispasmodic. The pubes may likewise be anointed with oil of juniper mixed with oil of amber and ani-seed; and then a cataplasm of roasted unions may be laid on hot. These things are likewise good when there is small stones, which they expel. But if these fail, and the symptoms are urgent, a catheter must be introduced into the bladder; which is much easier in girls than boys. See the article *STONE*.

For the diabetes, or that disease wherein the urine comes away crude, exceeding the quantity of the liquids drank, see the article *DIABETES*.

URINE, in agriculture, is of excellent use as a manure; and for land, trees, &c. is preferable to dung; as penetrating better to the roots, and removing divers infirmities of plants.

URINOUS SALTS, are the same with what we otherwise call alkali salts, or alkalies. See the articles *SALT* and *ALKALI*.

URN, *urna*, a kind of vase, of a roundish form, but biggest in the middle, like the common pitchers, now seldom used but in the way of ornament over chimney-pieces, in buffets, &c. The great use of urns among the antients was to preserve the ashes of the dead after they were burnt; for which reason they were called cineraria, and urnæ cinerariæ, and were placed sometimes under the tomb-stone whereon the epitaph was cut; and sometimes in vaults in their own houses. Urns were also used at their sacrifices to put liquid things in.

URN was also a roman measure for things liquid. See the article *MEASURE*.

UROCRITERIUM, a casting of water; or giving judgment on diseases by the sight of the urine. See *URINE*.

UROGALLUS, in ornithology, a species of the tetrao. See *TETRAO*.

The urogallus is of two kinds; the first being the urogallus, or tetrao major, with a white spot on the base of the wing, is otherwise called the cock of the mountain, being a very large and noble bird, nearly of the bigness of the turkey, and much resembling it in figure, only that it

is not so unweildy : the head is large and rounded : the beak is short, a little hooked at the point : the eyes are large, and there is a naked space over them by way of eye-brow, which is of a fine bright scarlet.

For the urogallus, or tetrao minor, otherwise called grouse, see GROUSE.

URSA, the BEAR, in astronomy, a name common to two constellations of the northern hemisphere, near the pole, distinguished by major and minor. The ura major, or the great bear, according to Ptolemy's catalogue, consists of thirty-five stars : according to Tycho's, of fifty-six : but in the britannic catalogue we have two hundred and fifteen.

The ura minor, or little bear, called also Charles's wain ; and by the Greeks cynosura ; by its neighbourhood to the north pole, gives the denomination *αρκτικός*, bear, thereto. Ptolemy and Tycho make it to consist of eight stars, but Flamsteed of fourteen.

URSULINES, in church-history, an order of nuns, founded originally by St. Angela of Brescia, in the year fifteen hundred thirty-seven, and so called from St. Ursula, to whom they were dedicated. They observe the rules of St. Augustine, and are chiefly noted for taking on them the education and instruction of young maids : their monasteries are a kind of schools where young ladies of the best families receive their education. The habit of these religious is a gown of black serge, or other stuff, tied about with a girdle of black leather. The ursulines are spread chiefly over France and Italy ; and their different observances in their several monasteries make them in truth so many distinct religious orders.

URSUS, the BEAR, in zoology. See the article BEAR.

URTICA, the ROMAN NETTLE, in botany, a genus of the monoecia tetrandria class of plants, having neither corolla nor pericarpium : the cup is connivent : the seed is single, ovated, obtuse, compressed and shining. See NETTLE.

URTICA MARINA, the SEA-NETTLE, in ichthyology, a species of Medusa, with four cavities on the under surface. See the article MEDUSA.

This appears, as floating on the water, to be a mere lifeless lump of jelly : it is of a whitish colour, with a cast of bluish-grey, and is of an orbiculated figure, elevated into a convexity in the middle on the upper side, flat on the under, and

furnished with a fringe of fine, and somewhat rigid, filaments round the edge, resembling white hairs : on the under surface there are four cavities near the center, each of an arcuated figure, and surrounded with an opaque line formed of about twenty-four parallel points or dots. From the very center of the under side there arise four crooked appendages, which have each a row of hairy filaments on the exterior edge ; and on the upper surface there is an appearance of fine vessels of a pale colour.

USAGE, in law. See the articles PRESCRIPTION and CUSTOM.

USAGE, in language. See LANGUAGE.

USANCE, *uso*, in commerce, is a determinate time fixed for the payment of bills of exchange, reckoned either from the day of the bills being accepted, or from the day of their date ; and thus called because regulated by the usage and custom of the places whereon they are drawn. See BILL of exchange.

Bills of exchange are drawn at one or more usances, either from sight or from date. The term is longer or shorter, according to the different countries. Usance from London to any part of France, is thirty days ; (this being declared to be a month, in regard to exchanges, in this kingdom) whether the month has more or fewer in it. Usance from London to Hamburgh, Amsterdam, Rotterdam, Middleburgh, Antwerp, Brabant, Zealand, and Flanders, and from these places to London, is one calendar month after the date of the bill. Usance, from London to Spain and Portugal, and from these places to London, is two calendar months after date. Usance from London to Genoa, Leghorn, Milan, Venice, and Rome, and from these places to London, is three months. See EXCHANGE.

Usance of Amsterdam upon Italy, Spain, and Portugal, is two months : upon France, Flanders, Brabant, Geneva, and upon any place in the seven United Provinces, is one month. Upon Francfort, Nuremburgh, Vienna, Ausburgh, Cologne, Leipzig, and other places of Germany, as also upon Hamburgh and Breslaw, is fourteen days after sight ; two usances twenty-eight, and half usance seven.

Usance from Dantzic, Coningsberg, and Riga, upon Amsterdam, is at one month after sight ; though it is common to draw from the first at forty days date, and from the others at forty-one, but oftener at

ten and eleven. And from Amsterdam on the said places at a month's date, without mentioning usance; tho' sometimes at forty and forty-one days; and sometimes on Breslaw at six weeks date. Most nations have generally agreed to allow the acceptor of a bill some small time for payment beyond that mentioned in the bill, termed days of grace or respite; but they generally disagree in the number and commencement of them.

See the article *DAYS of grace*.

USE, in law, the profit or benefit of lands and tenements; or a trust and confidence reposed in a person for the holding of lands, &c. that he to whose use the trust is made shall receive the profits.

Uses may be limited to a person and the wife he shall marry; and if the parties to a deed agree, and declare, that one of them shall make a feoffment, or levy a fine, to the use and intent that he shall hold the lands for his life, and after his decease another intail, and afterwards a third in fee simple, &c. the estate settles according to the uses in the deed.

The conveyances to uses are said to be of three sorts, *viz.* a covenant to stand seized; a feoffment, fine or recovery to uses; and a bargain and sale; which last a contingent use cannot be supported by, though it may by the two first.

A superstitious use, is where lands or goods are devised to a priest to pray for the souls of the dead, &c. in which case they become forfeited to the king: and where such an use is void, and the king cannot have the land, it shall not result to the heir at law; but it may be applied to charity.

USES and customs of the sea, are certain maxims or rules which form the basis of the maritime jurisprudence, by which the policy of navigation, and the commerce of the sea are regulated. See the article *NAVY*, &c.

These uses and customs consist of three kinds of regulations: the first called the laws or judgments of Oleron; the second, regulations made by the merchants of Wisbuy, a city in the island of Gothland, in the Baltic, antiently much famed for commerce; and the third, a set of regulations made at Lubec, by the deputies of the Hanse Towns. See the articles *OLERON*, *HANSE*, &c.

USEDOM, an island of Pomerania, in Germany, situated at the mouth of the river Oder, in the Baltic-sea: subject to the king of Prussia.

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USHANT, an island of France, fifteen miles west of the coast of Britany, at the entrance of the British-channel.

USHER, an officer, or servant, who has the care and direction of the door of a court, hall, chamber, or the like.

In the king's household there are two gentlemen ushers of the privy-chamber appointed to attend the door, and give entrance to persons that have admittance thither; four gentlemen-ushers, waiters; and eight gentlemen-ushers, quarter-waiters in ordinary.

USHER also signifies an officer of the court of Exchequer, of which there are four who attend the barons and chief officers of that court at Westminster, as also juries, sheriffs, &c. at the pleasure of the court. There is also an usher of the court of chancery.

USHER of the black rod, the eldest of the gentlemen-ushers, daily waiters at court, whose duty is to bear the rod before the king at the feast of St. George, and other solemnities: he has also the keeping of the chapter-house door, when a chapter of the order of the garter is sitting, and in time of parliament attends the house of peers, and takes delinquents into custody. He wears a gold-badge embellished with the ensigns of the order of the garter. See the article *Black ROD*.

USK, a river of Wales, which rises on the west of Brecknockshire, and runs south-east through that county and Monmouthshire, falling into the mouth of the Severn.

USNEA, in botany, a genus of mosses, wholly destitute of leaves, and composed only of long slender filaments or stalks, which are usually solid, rigid, and of a cylindric figure. The extremities, or other parts of these, are at times furnished with a sort of orbicular bodies, dry and destitute of use, but seeming to supply the place of flowers. These are hollow, in form of cups, but have no rim. The whole plants are fixed in the manner of mistletoe to the barks of trees. Micheli has given accounts of flowers and seeds in these plants; but Dillenius suspects the accuracy of this observation, and adds, that if there are such, they are too minute to be of any service in the general distinctions of the plants.

USQUEBAUGH, a strong compound liquor, chiefly taken by way of dram.

There are several different methods of making this liquor; but the following is esteemed one of the best: To two gal-

lons of brandy, or other spirits, put a pound of spanish-liquorice, half a pound of raisins of the sun, four ounces of currants, and three of sliced dates; the tops of baum, mint, savory, thyme, and the tops of the flowers of rosemary, of each two ounces; cinnamon and mace, well bruised, nutmegs, aniseeds, and coriander-seeds, bruised likewise, of each four ounces; of citron, or lemon and orange-peel, scraped, of each an ounce: let all these infuse forty-eight hours in a warm place, often shaking them together; then let them stand in a cool place for a week: after which the clear liquor is to be decanted off, and to it is to be put an equal quantity of neat white port, and a gallon of canary; after which it is to be sweetened with a sufficient quantity of double-refined sugar.

USTION, in pharmacy, the preparing of certain substances by burning them.

USTULATION, *ustulatio*, a word used by pharmaceutic writers to express the roasting or torrefying of humid or moist substances over a gentle fire, so as to render them fit for powdering. The same word is also used by some for what we call burning of wine.

USUCAPTION, *usucaptio*, in the civil law, is an acquisition of the property of a thing, by a possession and enjoyment thereof for a certain term of years prescribed by law.

USUFRUIT, *usus fructus*, in the civil law, the use or enjoyment of any lands or tenements; or the right of receiving the fruits and profits of an inheritance, or other thing, without a power of alienating or changing the property thereof.

USURER, a person charged with a habit or act of usury. See the article **USURY**.

USURIOUS CONTRACT, is any bargain or contract whereby a man is obliged to pay more interest for money than the statute allows.

USURPATION, in law, is an injurious using or enjoyment, of a thing for continuance of time, that belongs of right to another.

USURY, *usura*, in the general, denotes a gain or profit which a person makes of his money, by lending the same; or it is an increase of the principal, exacted for the loan thereof; or the price a borrower gives for the use of a sum credited to him by the lender, called, also, interest; and, in some antient statutes, dry-exchange. See the article **EXCHANGE**.

The word usury is generally taken in an evil sense, *viz.* for an unlawful profit which a person makes of his money; in which sense it is, that usury is forbidden by the civil and ecclesiastical, and even by the law of nature.

By stat. 12 Ann. c. 16. which is called The Statute against Excessive Usury, it is ordained, that no person shall take for the loan of any money, or other thing, above the value of five pounds for the forbearance of one hundred pounds for a year; and so in proportion for a greater or lesser sum: and it is declared, that all bonds, contracts, and assurances, made for payment of any principal sum to be lent on usury, above that rate, shall be void; and that whosoever shall take, accept, or receive, by way of corrupt bargain, loan, &c. a greater interest than that last above-mentioned, shall forfeit treble the value of the money lent; and also, that scrivners, solicitors, and drivers of bargains, shall not take or receive above five shillings for the procuring the loan of one hundred pounds for one year, on pain of forfeiting twenty pounds, &c.

There can be no usury without a loan, between which and a bargain the court has distinguished; and though a person is to pay double the sum borrowed, &c. by way of penalty, for the non-payment of the principal debt, it is not usury; so it also is in respect to the grant of an annuity for lives, or on condition, where it exceeds the usual interest, and the proportion attending contracts of this kind. Even if one secures a large interest and principal, and it is at the will of the party who is to pay; or where it happens that both the principal money and extraordinary interest are in hazard, or that a person may have less than his principal; as when a bond is made to pay money upon the return of a ship from sea, &c. either of these cases are not held to be usury.

In an action brought for usury, the statute made against it must be pleaded; and in pleading an usurious contract, as a bar to an action, the whole matter is to be set forth specially, because it lies within the party's own privacy; yet on an information on the statute for making such contract, it is sufficient to mention the corrupt bargain generally; because matters of this kind are supposed to be privily transacted; and such information may be brought by a stranger. 1 Hawk. P. C. 248. Likewise upon an information on the

the statute against usury, he that borrows the money may be a witness, after he has paid the same.

UT, a latin term signifying literally *as*, much used in stating of ratios and proportions. See the articles **RATIO** and **PROPORTION**.

Sir Isaac Newton assigns its use thus: if in determinate quantities of divers kinds be compared together, and one of them be said to be *ut*, *as*, any other directly or inversely, the meaning is, that the first is increased or diminished in the same ratio as the latter: and if one of them be said to be *ut*, *as*, two or more others directly, or inversely, the meaning is, that the first is increased or diminished in a ratio compounded of the ratios, in which the others are increased or diminished. Thus, if A be said to be *as*, B directly, and *as* C directly, and *as* D inversely, the meaning is, it is increased or diminished in

the same ratio with $B \times C \times \frac{1}{D}$, that is,

A and $\frac{BC}{D}$ are to each other in a given ratio.

UT, in music, the first of the musical notes, which, with the rest, was taken out of the hymn of St. John Baptist. *Ut queant laxis*, &c. See **SCALE**, **MUSIC**, &c.

UTENSIL, *utenfile*, a little domestic moveable, belonging principally to the kitchen: such are pots pans, &c.

Utensils are more particularly used in war, for the moveables which the host is obliged to furnish the soldiers, quartered with him; which are, a bed with bed-clothes, a pot, and a spoon.

UTERINE, *uterinus*, something belonging to the uterus, or womb of a woman.

Furor UTERINUS, in medicine, denotes a kind of madness, attended by lascivious speeches and gestures, and an invincible inclination to venery. See **FUROR**.

UTERUS, the **WOMB**, in anatomy, a hollow body, called also the matrix, of a form approaching to that of a pear, situated between the bladder and the rectum, and destined to the office of generation, for the containing the fœtus. It is connected in the anterior part with the vagina, and at its lateral part by the ligaments, lata and rotunda, being loose in its hinder part.

In women not with child, the length of the uterus is about three inches; its breadth, in the upper part, being about

two inches, and in the lower part one. Its thickness is about an inch and an half: in virgins, indeed, it is much smaller than this; but in women with-child it is of a different size, according to the different time of gestation.

Anatomists divide it into two parts; the upper and broader part they call the fundus uteri, and the lower they call the cervix, into which it is that the vagina opens. See the article **VAGINA**.

The orifice, or, as it is otherwise called, the internal mouth of the womb, opens into the vagina, in form of the glans penis in man: it is very small in virgins, but in women who have had children, or who are with child, it is larger; and in the last it is always closed up with a glutinous humour: in the time of delivery, it in a wonderful manner expands itself, so as to give passage to the child. See the article **DELIVERY**.

The substance of the womb is masculine, being composed of a various plexus of fleshy fibres, with a great number of vessels between. In women not with-child it is compact and firm; in those with child it is spongy and sinuous, and is capable of wonderful dilatation, with out any diminution of its thickness. It is covered externally with a membrane from the peritonæum; and internally, its cavity is lined with a porous and nervous membrane: this cavity is very small in virgins; and in women with child the inner membrane almost entirely disappears.

The blood vessels of the uterus are tortuous, and make a thousand anastomoses with one another: they open by a number of little mouths into the uterus and vagina, and are the sources of the menstrual discharge in women. See the article **MENSES**.

The arteries are of three kinds, *viz.* spermatics from the aorta; very large ones from the hypogastrics; and others from the hæmorrhoidal arteries. The veins of the uterus are also of three kinds, and of the same denominations: they have valves, and are greatly larger than the arteries, especially in women with-child. The nerves of the womb are from the intercostals, and those of the os sacrum. The lymphatics have long since been discovered in brutes; but Morgagni has of late years found them also in human subjects. See the articles **ARTERY**, **VEIN**, **NERVE**, &c.

UTILE, a latin term, signifying profitable or useful; in which sense it is sometimes used by english writers.

UTOXETER, a market-town of Staffordshire, twelve miles south-east of Stafford.

UTRECHT, the capital of a province of the same name, in the united Netherlands, situated twenty-three miles south-east of Amsterdam.

UTRICULARIA, in botany, a genus of the diandria-monogynia class of plants, with a ringent, bilabiated, monopetalous flower; and its fruit a large, globose, and unilocular capsule, containing a number of small seeds.

UVA URSI, in botany, a name used by Tournefort for a species of arbutus. See the article **ARBUTUS**.

UVEA, in anatomy, the third or outermost coat of the eye. See **EYE**.

VULCANO, or **VOLCANO**, in natural history, a burning mountain, or one that vomits forth fire, flame, ashes, cinders, &c. See the article **MOUNTAIN**.

As to the cause of vulcanos, it is found by experience, that there are several inflammable bodies, which, being mixed together in due proportion, will kindle into flame by fermentation alone, without the help of any fiery particles. Thus M. Lemery having covered up in the earth about fifty pounds of a mixture, composed of equal parts of sulphur and filings of iron, tempered with water; after eight or nine hours time, the earth, where it lay, vomited up flames. From this experiment we see the true cause of the fire of *Ætna*, *Vesuvius*, and other burning mountains, which probably are made up of sulphur and some other matter proper to ferment with it, and take fire. See **ÆTNA**, **VESUVIUS**, &c.

VULGATE, a very antient latin translation of the Bible, and the only one the church of Rome acknowledges authentic. See the article **BIBLE**.

The antient vulgate of the Old Testament was translated almost word for word from the greek of the **LXX**. The author of the version is not known, nor so much as guessed at.

VULGATE of the New Testament. This the romanists generally hold preferable to the common greek text, in regard it is this alone, and not the greek text, that the council of Trent had declared authentic. Accordingly that church has, as it were, adopted that edition. The

priests read no other at the altar, the preachers quote no other in the pulpit, nor the divines in the schools.

VULNERARY, in medicine, an epithet given to remedies proper for the cure of wounds and ulcers.

All medicines of this intention are supposed both to cleanse and heal; that is, incarnate, or fill up with new flesh, all ulcerations and foulnesses. Under this head are ranged all such balsamics as are not only softening and adhesive, but also, by a peculiar activity, joined with a suitable configuration of parts, are apt to abrade and carry along with them what particles they lay hold on in their passage.

VULPES, the Fox. See the article **FOX**.

VULTURE, a genus of birds, the characters of which are as follow: there are four toes on each foot, and three of these are placed forwards; the neck is long, and almost bare of feathers; the legs are covered with feathers down to the feet, or nearly so; and under the throat there is a space covered with hairs instead of feathers; the head also, in many species, is naked, and has at the most only a downy matter on it, instead of feathers; and the under part of the wings is downy.

This genus comprehends the black vulture, the boetic vulture, the hare-catcher, the golden breasted vulture, the brown vulture, and brasilian vulture.

VULVA, in anatomy, a name given as well to the uterus, or womb, as to the cunnus, or pudendum muliebre. See the articles **UTERUS** and **PUDENDUM**.

UVULA, in anatomy, a round, soft, spongy body, like the end of a child's finger, suspended from the palate, near the foramina of the nostrils, perpendicularly over the glottis. Its use is to break the force of the cold air, and prevent its entering too precipitately into the lungs. It is formed of a duplicature of a membrane of the palate; and is called, by some authors, columella, and by others gurgulio.

It is moved by two pair of muscles, and suspended by as many ligaments.

Prolapsus UVULÆ. See the article **PROLAPSUS**.

UVULARIA, in botany, a genus of the hexandria-monogynia class of plants, the flower of which consists of six very long lanceolated petals; and its fruit an ovato-oblong trilocular capsule, containing several roundish and compressed seeds.

UXBRIDGE, a market-town of Middlesex, situated on the river Colne, fifteen miles west of London.

UXOR, among chemists, signifies the mercury of metals. See the articles **MERCURY** and **METAL**.

UXORIUM, in antiquity, a fine or forfeit paid by the Romans, for not marrying. See the article **MARRIAGE**.

UZBECK, or **OUSBECK**, **TARTARY**, a

large country of Asia, bounded by Calmuc Tartary on the north, by Tibet on the east, by India and Persia on the south, and by a great desert, which separates it from the Caspian sea, on the west.

UZES, a town of Languedoc, in France, sixteen miles north of Nismes.

UZIFIR, **UZUFAR**, or **UZIFUR**, in chemistry, a name which some authors give to cinnabar. See the article **CINNABAR**.



W.

W, or **w**, is the twenty-first letter of our alphabet, and is composed, as its name implies, of two v's. It was not in use among the Hebrews, Greeks, or Romans, but chiefly peculiar to the northern nations, the Teutones, Saxons, Britons, &c. But still it is not used by the French, Italians, Spaniards, or Portuguese, except in proper names and other terms borrowed from languages in which it is originally used, and even then it is sounded like the single v. This letter is of an ambiguous nature, being a consonant at the beginning of words, and a vowel at the end. It may stand before all the vowels except *u*, as *water*, *wedge*, *winter*, *wonder*: it may also follow the vowels, *a*, *e*, *o*, and unites with them into a kind of double vowel, or diphthong, as in *saw*, *few*, *cow*, &c. It also goes before *r*, and follows *s* and *th*, as in *wrath*, *swear*, *thwart*; it goes before *b* also, though in reality it is sounded after it, as in *when*, *what*, &c. In some words it is obscure, as in *shadow*, *widow*, &c.

WAAG, a river of Hungary, which rises in the Carpathian mountains, on the confines of Poland, and running first from east to west, then turns south, and passing by Leopoldstadt, falls into the Danube, opposite to the island of Schut.

WAAL, a river of the United Netherlands, being one of the branches of the Rhine, which runs from east to west, thro' the Betue, in the province of Gelderland, passing by Nimeguen, Tiel, Bommel, and Gorcum, and, continuing its course eastward, unites its waters with the Maes, and, passing by Dort, falls into the German sea below the Briel.

WADD, or **WADDING**, is a stopple of paper, hay, straw, or the like, forced into a gun upon the powder, to keep it close in the chamber; or to put up close to the shot, to keep it from rolling out. See the article **GUN**, &c.

WAFE. See the article **WAIF**.

WAST. To *wast* a ship, is to convoy her safe, as men of war do merchant ships. To make a *wast*, is to hang out some coat, sea-gown, or the like, on the main-shrouds of the ship, as a signal for people to come aboard, and signifying that the ship is in great distress.

WAFERS, or *Sealing WAFERS*, are made thus: take very fine flour, mix it with glair of eggs, isinglass, and a little yeast; mingle the materials; beat them well together, spread the batter, being made thin with gum-water, on even tin-plates, and dry them in a stove; then cut them out for use.

You may make them of what colour you please, by tinging the paste with brazil or vermilion for red; indigo or verditer, &c. for blue; saffron, turmeric, or gamboge, &c. for yellow.

Wafers, on importation, pay a duty of of $4\frac{78\frac{1}{2}}{100}$ d. the pound, and draw back on exportation $4\frac{31\frac{1}{2}}{100}$ d. the pound.

WAGE, in law, denotes the giving security for the performance of any thing.

WAGER of *law*, is used where an action of debt is brought against a person, upon a simple contract between the parties, without deed or record, and the defendant, in presence of his compurgators, swears in court, that he owes the plaintiff nothing, in form and manner as he has de-

declared: and here the reason of waging of law is, because the defendant may have paid to the plaintiff his debt in private, or before witnesses who may be all dead, and therefore the law allows him to wage his law in discharge; and in that case, his oath shall be accepted to discharge himself, rather than the law will suffer him to be charged upon the bare allegation of the plaintiff. The method of waging law is this, *viz.* the defendant generally brings six compurgators with him into court, and stands at the end of the bar towards the right hand of the chief justice; the secondary asks him, whether he will wage his law? whereto if he answers that he will, the judges admonish him to be well advised, telling him the danger of taking a false oath; and if he still persists, then the secondary says, and the defendant, who wages his law, repeats after him, "Hear this, ye justices, that I C. D. do not owe to A. B. the sum of , nor any penny thereof, in manner and form as the said A. B. has declared against me: so help me God." After the defendant has thus sworn, and the compurgators given in, upon oath, that they believe he swears true, the plaintiff is for ever barred; it being as much as if a verdict had passed against him.

WAGGON, a vehicle or carriage, of which there are various forms, accommodated to the different uses they are intended for. The common waggon consists of the shafts or rads, being the two pieces which the hind horse bears up; the welds; the flotes, or cross-pieces, which hold the shafts together; the bolster, being that part on which the fore wheels and the axle-tree turn, in wheeling the waggon a-cross the road; the chest, or body of the waggon, having the staves or rails fixed thereon; the bales, or hoops, which compose the top; the tilt, the place covered with cloth, at the end of the waggon. For the principles on which this carriage is constructed, see **WHEEL**.

WAGGON-master-general, in the military art, is he who has the ordering and marching of the baggage of the army. On a day of march he meets the baggage at the place appointed in the orders, and marshals it according to the rank of the brigade or regiment each waggon belongs to, which is sometimes in one column, sometimes in two; sometimes after the artillery; and sometimes the baggage of each column follows their respective column.

WAGNINGEN, a town of the United Provinces, in the province off Gelderland, situated on the river Leech, eight miles north-west of Nimeguen.

WAGRIA, the eastern division of the dutchy of Holstein, in the circle of Lower Saxony, in Germany, bounded by the Baltic sea on the north, east, and south.

WAGTAIL, in ornithology, the name of two different species of motacilla. See the article **MOTACILLA**.

The white or common wagtail is the motacilla with a black breast. This is a very beautiful bird, much about the size of the goldfinch, but the body is longer in proportion, and much better covered with feathers; the head is large and rounded; the eyes are large, and their iris hazel; the beak is strait, slender, moderately long and black; the beak and the eyes are surrounded with a space of white, which is continued in a broad line down almost to the wings; the crown of the head, both sides of the neck, and back are black, the breast and belly are white; the tail is long, and both that and the wings are variegated with black and white. See plate CCXCVI. fig. 3.

The other species is the yellow wagtail, or the yellow-breasted motacilla, much resembling the former, only that the breast and belly are yellow; the sides of the head variegated with some strokes of yellow, and the wings with white.

WAIF, or **WAFE**, in law, a term applied to such goods as a thief having feloniously stolen, on his being closely pursued, are waved or left by the felon, which become forfeited to the king, or lord of the manor: and so it also is where a felon has the goods in his custody, and apprehending that pursuit is made, he flies, and leaves them behind him. Tho' waif is properly applied to goods that are stolen, yet it may be also said of goods not stolen or taken away, as where a person is pursued with hue and cry as a felon, and he flies and leaves his own goods; in this case these shall be forfeited as stolen goods, or what are usually called fugitives goods.

Waif is also applied to things lost, and estrays, which, no owner appearing, are forfeited to the lord of the manor, after they have been cried and published in the markets.

WAIGRATS STRAITS, situated between Nova Zembla and Russia, through which the Dutch sailed to the north, as high as 75°, in order to discover a north-east passage

passage to China, and the East Indies.

WAIN, in astronomy. See **URSA**.

WAINFLEET, a market-town of Lincolnshire, thirty-five miles east of Lincoln.

WAINSCOT, in building, the timber-work that serves to line the walls of a room, being usually made in pannels, and painted, to serve instead of hangings. It is usual even in halls to have wainscot breast high, by reason of the natural moistness of the walls. Some joiners put charcoal behind the pannels, to prevent the sweat of the stone and brick walls from ungluing the joints; others use wool for the same purpose, but the only sure way is to prime over the back sides of the joints with white lead, spanish brown, or linseed-oil.

The wainscotting with norway oak, according to Neve, the workman finding stuff, is valued at 6 s. or 7 s. per yard square; plain square wainscotting, the workman finding deal, is valued at 3 s. and 3 s. 6 d. per yard. Ordinary bisection wainscotting, the workman finding deal, is worth 3 s. and 6 d. and 4 s. per yard. Large bisection wainscotting, with dantzic stuff, is valued at 6 s. or 7 s. per yard.

WAIVE, according to the different acceptation of the word, signifies to forsake; but in the law it is especially applied to a woman, who, for any crime, for which a man may be outlawed, is termed waive.

WAIVER, in law, denotes the passing by of a thing, or a refusal to accept thereof; and relates sometimes to an estate conveyed to a person, and sometimes to a plea. It is held, where a particular estate is granted with a remainder over, that case, he that has it, may not regularly waive it to the damage of him in remainder; though where one has the reversion it is otherwise, for that is not hurt by such waiver.

WAKE of a ship, is the smooth water astern when she is under sail: this shews the way she has gone in the sea, whereby the mariners judge what way she makes. For if the wake be right astern, they conclude she makes her way forwards; but if the wake be to leeward a point or two, then they conclude she falls to the leeward of her course. When one ship, giving chase to another, is got as far into the wind as she, and sails directly after her, they say, she has got into her wake. A ship is said to stay to the weather of her wake, when in her staying, she is so quick, that she does not fall to leeward

upon a tack, but that when she is tacked, her wake is to the leeward; and it is a sign she feels her helm very well, and is quick of steerage.

WAKE, is the eve feast of the dedication, of churches, which is kept with feasting and rural diversions.

WAKEFIELD, a market-town in the west-riding of Yorkshire, situated on the river Caulder, twenty-four miles south-west of York.

WALACHIA, a province of Turkey in Europe, bounded by the Irongate mountains, which separate it from Transilvania, on the north-west; by Moldavia on the north-east; by the river Danube, which separates it from the province of Bulgaria, on the south-east; and the same river separates it from the province of Servia on the south-west. It is two hundred miles long, and one hundred broad.

WALCOURT, a town of the bishopric of Liege, situated on the confines of Namur, eight miles south of Charleroy.

WALDEC, a town of Germany, in the circle of the Upper Rhine, and landgraviate of Hesse Cassel, twenty miles south-west of Hesse Cassel city.

WALDEN, a market-town of Essex, situated twenty-five miles north-west of Chelmsford.

WALE, or **WALES**, in a ship, those outermost timbers in a ship's side, on which the sailors set their feet in climbing up. They are reckoned from the water, and are called her first, second, and third wale, or bend. See the article **SHIP**.

WALE-KNOT, a round knot or knob made with three strands of a rope, so that it cannot slip, by which the tacks, top-sail sheets, and stoppers are made fast, as also some other ropes.

WALE REARED, on board a ship, a name the seamen give to a ship, which, after she comes to her bearing, is built strait up: this way of building, though it does not look well; nor is, as the seamen term it, ship shapen; yet it has this advantage, that a ship is thereby more roomy within board, and becomes thereby a wholesome ship at sea, especially if her bearing be well laid out.

WALES, a principality in the west of England, comprehending 12 counties, bounded by Cheshire, Shropshire, Herefordshire, and Monmouthshire, on the east, and surrounded by the sea called the Irish Channel, on the north, west, and south.

New WALES, the south-west coast of Hudson's Bay, in North America, so called;

now

now possessed by the english Hudſon's Bay company.

WALKER, the ſame with foreſter. See the article **FORESTER**.

WALK, in gardening. See **ALLEY**.

Thoſe made of gravel, ſand, or graſs, are the moſt common in England; but where gravel or ſand cannot be procured, they are ſometimes laid with powdered coal, ſea-coal aſhes, or powdered brick. In order to the laying of gravel walks, it is very proper that the bottom of them be filled with ſome lime-rubiſh, coarſe gravel, flint-ſtones, or other rocky materials. This bottom ſhould be laid eight or ten inches thick, over which the coat of gravel ſhould be fix or eight. The common allowance for a gravel walk of five feet breadth, is an inch in the crown; ſo that if a walk be twenty feet wide, according to this proportion, it will be four inches higher in the middle than on each ſide; and a walk of twenty-five feet will be five inches; one of thirty feet fix inches; and ſo on. In order to lay gravel-walks firm, it will be neceſſary to give them three or four water rollings; that is, they muſt be rolled, when it rains ſo very faſt, that the walks ſwim with water: this will cauſe the gravel to bind. Iron mould gravel is the beſt for binding; or gravel with a little binding loam amongſt it. The beſt gravel for walks is ſuch as abounds with ſmooth pebbles, which, being mixed with a due proportion of loam, will bind like a rock, and is never injured by wet or dry weather. The width of the walks muſt always be proportioned to their length, and the ſize of the garden. For farther particulars, ſee the article **GRAVEL**.

Graſs walks in a garden are both ornamental and delightful. See **GRASS**.

Sand walks are alſo frequently made in gardens, as being leſs expenſive in the making and keeping, than the former; for as the greateſt part of the walks made in gardens twiſt about in an irregular manner, it would be very difficult to keep them handſome if they were made of gravel; and as the walks are for the moſt part ſhaded with trees, ſo the dripping of the water from their branches in hard rains, would waſh the gravel in holes, and render the walks very unſightly. When the ground is traced out in the manner the walks are deſigned in, the earth ſhould be taken out of the walks, and laid in the quarters. The depth of this ſhould be proportioned to

the nature of the ſoil; for where the ground is dry, the walks need not be elevated much above the quarters; ſo the earth ſhould be taken out four or five inches deep in ſuch places; but where the ground is wet, the bottom of the walks need not be more than two inches below the ſurface, that the walks may be raiſed ſo high as to throw off the wet into the quarters. After the earth is taken out, the bottom of the walks ſhould be laid with rubbiſh four or five inches thick, and beaten down as cloſe as poſſible; then the ſand ſhould be laid on about three inches thick; and after treading it down, it ſhould be raked over, to level and ſmooth the ſurface. In doing of this, the whole ſhould be laid a little rounding, to throw off the wet: but there will be no neceſſity of obſerving any exactneſs therein; for as the whole ground is to have as little appearance of art as poſſible, the rounding ſhould appear natural, and only ſo contrived, as that the water may have free paſſage off.

WALK, in the manege, is the ſloweſt, and leaſt raiſed of all a horſe's goings. It is performed by the horſe's lifting up his two legs on a ſide, the one after the other, beginning with the hind leg firſt. Thus, if he leads with the legs of the right ſide, then the firſt foot he liſt is the far hind-foot, and in the time he is ſetting it down (which in a ſtep is always ſhort of the tread of his fore-foot on the ſame ſide) he liſts his far fore-foot, and ſets it down before his near fore-foot. Again, juſt as he is ſetting down his far fore-foot, he liſts up his near hind-foot, and ſets it down again juſt ſhort of his near fore-foot; and juſt as he is ſetting it down, he liſts his near fore-foot, and ſets it down beyond his far fore-foot.

WALL, in architecture, the principal part of a building, as ſerving both to incloſe it, and ſupport the roof, floors, &c. See the article **BUILDING**.

Walls are diſtinguiſhed into various kinds, from the matter whereof they conſiſt, as plaftered or mud-walls, brick-walls, ſtone-walls, flint, or-boulder walls, and boarded walls. In all which theſe general rules are to be regarded. 1. That the right angle therein depending is the true cauſe of all ſtability, both in artificial and natural poſition. 2. That the moſt ſolid and heaviſt materials be the loweſt, as fitter to bear than to be borne. 3. That the walls, as they riſe, diminiſh proportionably in thickneſs, for eaſe both

of weight and expence. 4. That certain courses or ledges, of more strength than the rest, be interlaid, like bones, to strengthen the whole fabrick. See the article HOUSE, &c.

Brick-walls are the most important and usual amongst us. In these, particular care is to be taken about laying of the bricks; that in summer they be laid as wet, and in winter as dry, as possible, to make them bind the better with the mortar: that in summer, as fast as they are laid, they be covered up, to prevent the mortar, &c. from drying too fast: that in winter they be covered well to protect them from rain, snow, and frost, which are all enemies to mortar: that they be laid joint on joint in the middle of the walls as seldom as may be: but that good bond be made there as well as on the outside. Care is to be taken that the angles be firmly bound, which are the nerves of the whole edifice. In order to which, in working up the walls of a building, it is not advisable to raise any wall above eight feet high, before the next adjoining wall be wrought up to it, that so good bond may be made in the progress of the work: it may be worth notice, that a wall a brick and a half thick, with the joint, will be in thickness fourteen inches, or very near; whence 150 or 160 bricks will lay a yard square measured upon the face of the building; and to the square of ten foot are usually allowed 1700 or 1800 bricks. Flint, or boulder walls are much used in some parts of Sussex and Kent, for fence-walls, round courts, gardens, &c. A right and left handed man fits well for this work, as they have a hod of mortar poured down upon the work, which they part between them, each spreading it towards himself, and so they lay in the flints. The mortar for this work must be very stiff.

WALL, in gardening. Of all materials for building walls for fruit-trees, brick is the best; it being not only the handsomest, but the warmest and kindest for the ripening of fruit; and affording the best conveniency for nailing, as smaller nails will serve in brick than will in stone walls, where the joints are larger; and if the walls are coped with free-stone, and stone pillars or columns at proper distances, to separate the trees, and break off the force of the winds, they are very beautiful, and the most profitable walls of any others. In some parts of England there are walls built both of brick and

stone, which are found very commodious. The bricks of some places are not of themselves substantial enough for walls; and therefore some persons that they might have walls both substantial and wholesome, have built these double, the outside being of stone, and the inside of brick: but there must be great care taken to bind the bricks well into the stone, otherwise they are very apt to separate one from the other, especially when frost comes after much wet.

There have been several trials made of walls built in different forms; some of them having been built semicircular; others in angles of various sizes; and projecting more towards the north, to screen off the cold winds: but there has not as yet been any method which has succeeded near so well as that of making the walls strait, and building them upright. Where persons are willing to be at the expence, in the building of their walls substantial, they will find it answer much better than those which are slightly built, not only in duration, but in warmth: therefore a wall two bricks thick, will be found to answer better than that of one brick and a half: and if in building of garden-walls they are grouted with soft mortar, to fill and close all the joints, the walls will be much stronger, and the air will not so easily penetrate, as it does through those which are commonly built.

For the aspect or situation of garden-walls, see the article EXPOSURE.

WALLINGFORD, a borough town of Berkshire, situated on the river Thames, twelve miles north of Reading.

WALLOONS, the inhabitants of a considerable part of the Spanish Netherlands, viz. those of Artois, Hainault, Namur, Luxembourg, and part of Flanders and Brabant.

The wallon language is said to have been that of the ancient Gauls or Celts.

WALRUS, in zoology, the english name of the phoca, with a canine teeth exerted. See the article PHOCA.

This is much larger than the sea-calf, or phoca, with the canine teeth covered; growing to the size of the largest ox; the head is very large, and almost of a rounded figure; the eyes are large and prominent; there are no ears, but only an aperture on each side of the head, of an oblong form, and not very large; the nose is obtuse; the nostrils large, and the creature contracts and dilates them

at pleasure; the mouth is very large, and the upper part of it furnished with thick and cartilaginous whiskers; the tongue is short, the canine teeth of the upper jaw are of an enormous length and size, and they hang downwards and forwards toward the breast; the creature uses these strange weapons to climb upon the ice, and to hang itself to the rocks in its getting on shore to sleep.

WALNUT-TREE, juglans, in botany. See the article **JUGLANS**.

WALSALL, a market-town of Staffordshire, thirteen miles south of Stafford.

WALSHAM, a market-town of Norfolk, eleven miles north of Norwich.

WALSINGHAM, a market-town of Norfolk, eighteen miles north-west of Norwich.

WALTHAM, a market-town of Leicestershire, sixteen miles north-east of Leicester.

WALTHERIA, in botany, a genus of the monadelphia-pentandria class of plants, the flower of which consists of five petals, vertically cordated and patent; the fruit is an unilocular bivalve capsule, vertically ovated, and the seed is single, obtruse, and broadest at top.

WANGEN, a market town of Germany, in the circle of Suabia, twenty-five miles east of Constance.

WANLASS, in hunting. Driving the wanlass, is the driving of deer to a stand, that the lord may have a shoot, which is one of the customary services of fiefs.

WANTAGE, a market-town of Berkshire, fifteen miles south of Oxford.

WAPENTAKE, (from the Saxon) the same with what we call a hundred, and more especially used in the northern counties beyond the river Trent. There have been several conjectures as to the original of the word; one of which is, that antiently musters were made of the armour and weapons of the inhabitants of every hundred; and from those that could not find sufficient pledges of their good abearing, their weapons were taken away, and given to others; whence it is said this word is derived. See **HUNDRED**.

WAR, a contest or difference between princes, states, or large bodies of people; which not being determined by the ordinary measures of equity and justice, is referred to the decision of the sword.

Holy WAR, is that antiently maintained by leagues and croisades, for the recovery of the holy land. See **CROISADE**.

Council of WAR. See **COUNCIL**.

Man of WAR. See **SHIP**, **RATE**, &c.

Place of WAR. See the article **PLACE**.

WARADIN little, a town of Upper Hungary, twenty-three miles east of Tokay, east long. $21^{\circ} 20'$, north lat. $48^{\circ} 18'$.

WARADIN great, a town of Upper Hungary, an hundred miles east of Buda: east long. $21^{\circ} 50'$, north lat. $47^{\circ} 15'$.

WARD, in law-books, a word of divers significations: thus, a ward in London, is a part of the city committed to the special charge of one of the aldermen of the city. There are twenty-six wards in London, which are as hundreds, and the parishes thereof as towns. A forest is also divided into wards, and so are most of our hospitals.

WARD, **WARDA**, or **WARDAGIUM**, is also used, in our antient writings, for the custody of a town or castle, which the tenants and inhabitants were bound to keep at their own charge.

WARD-HOOK, or **WADD-HOOK**, in gunnery, a rod of staff with an iron end turned serpent-wise, or like a screw to draw the wadding out of a gun when it is to be unloaded. See the article **WADD**.

WARDA ECCLESIAIUM, denotes the guardianship of churches; which is in the king, during vacancies, by reason of the regalia or temporalities.

WARDEN, or **GUARDIAN**, one who has the charge or keeping of any person, or thing, by office. See **GUARDIAN**. Such is the warden of the fleet, the keeper of the fleet-prison; who has the charge of the prisoners there, especially such as are committed from the court of chancery for contempt.

Warden, in an university, is the head of a college; answering to what in other colleges we call the master thereof.

Warden, or **lord-warden** of the cinque ports, is the governor of these noted havens; who has the authority of an admiral, and sends out writs in his own name.

Warden of the mint, is an officer whose business it is to receive the gold and silver bullion brought in by the merchants, to pay them for it, and oversee the other officers. He is called keeper of the exchange and mint.

Church WARDENS. See **CHURCH**.

WARDHUY, a port of Norwegian Lapland, 120 miles south-east of the north-cape: east long. 28° , and north lat. 71° .

WARDMOTE, in London, is a court so called which is kept in every ward of the city, answering to the curia comitia in antient Rome. See **COURT**.

WARD.

WARDROBE, a closet, or little room adjoining to a bed-chamber, serving to dispose and keep a person's apparel in; or, for a servant to lodge in, to be at hand to wait, &c.

Wardrobe, in a prince's court, is an apartment wherein his robes, wearing apparel, and other necessities are preserved under the care and direction of proper officers; as the master of the wardrobe, clerk, &c. of the wardrobe. See the article **MASTER** and **CLERK**.

WARE, a market-town of Hertfordshire, under the meridian of London, and twenty miles north of that city.

WAREHAM, a borough of Dorsetshire, seventeen miles east of Dorchester.

WARMINSTER, a market-town of Wiltshire, seventeen miles north-west of Salisbury.

WARN, in law, is to summon a person to appear in a court of justice. See the article **SUMMONS**.

WARNEMUNDE, a town of Lower Saxony, twenty-six miles north-east of Wismar: east long $12^{\circ} 15'$, and north lat. $54^{\circ} 30'$.

WARNETON, a town of Flanders, seven miles north-west of Lille.

WARNING-PIECE, in the military art, is the gun which is fired every night about sun-set, to give notice to the drums and trumpets of the army to beat and sound a retreat or tattoo, which is likewise called, setting the watch. See the article **RETREAT**.

WARNING-WHEEL, in a clock, is the third or fourth, according to its distance from the first wheel. See the article **CLOCK**.

WARP, in the manufactures, is the threads, whether of silk, wool, linen, hemp, &c. that are extended lengthwise on the weaver's loom; and a-crofs which the workman by means of his shuttle passes the threads of the woof, to form a cloth, ribband, fustian, or other matter.

For a woollen stuff to have the necessary qualities, it is required that the threads of the warp be of the same kind of wool, and of the same fineness throughout; that they be sized with slanders or parchment-size, well prepared, and that they be in sufficient number with regard to the breadth of the stuff to be wrought.

To warp a ship, is to shift her from one place to another, when the wind and tide will permit it without danger.

WARRANT, an act, instrument, or obligation, whereby a person authorises

another to do something which he otherwise had not a right to do.

Warrant of attorney, is that whereby a man appoints another to do something in his name, and warrants his action. It seems to differ from a letter of attorney, which passes under hand and seal of him who makes it, before creditable witnesses; whereas warrant of attorney, in personal, mixed, and some real actions, is put in of course by the attorneys for the plaintiffs or defendants.

WARRANTY, *warrantia*, a promise or covenant by deed, made by the bargainer for himself and his heirs, to warrant and secure the bargainee and his heirs against all men for enjoying the thing agreed on between them.

WARRANTIA CHARTÆ, a writ that lies for a person who is infeoffed in lands and tenements, with clause of warranty, and is impleaded in an assize, or writ of entry, wherein he cannot vouch or call to warranty. See the article **VOUCHER**.

WARRANTIA DIEI, a writ which lies in case where a man, having a day assigned personally to appear in court to an action, wherein he is sued, is, in the mean time, by commandment employed in the king's service; so that he cannot come at the day assigned. It is directed to the justices, ordering them not to find or record him in default.

WARREN, *warrena*, a franchise, or place privileged either by prescription or grant from the king, to keep beasts and fowl of warren in; as rabbits, hares, partridges, pheasants, &c.

By statute 21 Edward III. a warren may lie open, and there is no need of closing it in, as there is a park.

In the setting up a warren, great caution is to be used for the fixing upon a proper place, and a right situation. It should always be upon a small ascent, and exposed to the east or the south. The soil that is most suitable, is that which is sandy; for when the soil is clayey or tough, the rabbits find greater difficulty in making their burrows, and never do it so well; and if the soil be boggy or moorish, there would be very little advantage from the warren, for wet is very destructive of these animals.

All due precautions must be taken, that the warren be so contrived, that the rabbits may habituate themselves to it with ease. Many would have it that warrens should be enclosed with walls;

but this is a very expensive method, and seems not necessary nor advisable; for we find but very few that are so, and those do not succeed at all the better for it.

WARRINGTON, a market-town of Lancashire, seventeen miles east of Liverpool.

WARSAW, the capital of Warsovia, and of the kingdom of Poland: east long. $21^{\circ} 5'$, and north lat. $52^{\circ} 15'$.

WARSOVIA, or **MASSOVIA**, a province of Poland, bounded by Prussia, on the north; by Polachia, on the east; by the province of Little Poland on the south; and by that of Great Poland on the west.

WART, *verruca*, in surgery, a little round hard excrescence arising from the flesh like a pea.

A wart begins at the cutis, and seems to be either an efflorescence of the serum of the blood, which hardening in the surface of the skin makes a dry tumor; or else some small luxuriancy of the little arteries of the cutis, which thrust themselves out, making a petty sarcoma, which we call a soft wart. See **SARCOMA**.

According to the variety of the tumour, it is sometimes whole with a smooth surface, sometimes chapped and uneven. The method of cure which deserves to be first mentioned, is by ligature or vindture; this is performed upon such of these excrescences as are slender about the roots, and in a manner pendent, by firmly tying about them an horse-hair, or a silken or linen-thread. The waters, being deprived of the juices which nourish them through a constriction of the vessels by the ligature, gradually wither and fall away.

Another method of cure, is the surgeon's instrument, in which the wart is taken up by an hook or forceps, and then very nicely separated by the scissors. The wound is treated for some time with an application of the lapis infernalis, or some other corroding medicine, that, if any part of a root should remain, from which a new tubercle might arise, it might be consumed and destroyed. See the article **WOUND**.

The cure by caustics is best performed by cutting off the hard upper part of the wart, with a razor or scissors, and then surrounding its bottom with a circle of wax to prevent the spreading of the remedies; to touch it daily with oil of tartar, spirit of salt, aqua-fortis, or butter of antimony. See the article **CAUSTIC**.

The cure by cautery is performed by choosing a cautery of a proper size, and with that burning down to the root of the wart. This is the most painful of all the methods of extirpating these excrescences; but the pain is but for a moment, and the warts extirpated this way never return again.

The cure by evulsion is performed by anointing them with softening ointment, and then seizing them artfully between the thumb and fore-finger, and forcibly wrenching them out. This is a mountebank method, and a bad one; for it is not only very painful, but the warts commonly grow up again.

When warts are found to look livid and blue, it is best to let them alone entirely; because when irritated, they frequently degenerate into a cancer. See the article **CANCER**.

WARTA, a town of Great Poland, situated on a river of the same name, fifty-seven miles south-east of Posen.

WARTENBURG, a town of Silesia, twenty miles north-east of Breslaw.

WARWICK, the capital of Warwickshire, situated on the river Avon, eighty miles north-west of London: west long. $1^{\circ} 32'$, north lat. $52^{\circ} 20'$.

WARWICK, is also a town of Flanders, eight miles south-east of Ypres.

WASEIGNE, a town of the Austrian Netherlands, nine miles north of Namur.

WASH, among distillers, the fermentable liquor used by the malt-distillers. See the article **DISTILLERY**.

It should be about the strength of the ten shilling small-beer; and if the spirit be expected fine, it had better be too thin than too thick. It is only made by mixing the water hot with the malt ground into meal. If the water be too hot, the mixture will become gluey; and if too cool, a part of the virtue of the malt will be lost. Under the right application of the water is to be considered the proper manner of agitating the mass, so that all the parts of the aqueous fluid may come fully and freely in contact with the soluble particles of the subject. When once the water is well saturated by standing on the malt a proper time, it must be drawn off, and fresh poured on, till at length the whole virtue, or all the sugary sweetness of the malt is extracted, and nothing but a fixed husky matter remains behind, incapable of being farther dissolved by the action of hot or boiling water; or of being advantageously wash-
ed

ed or rinsed out by the bare affusion of cold. This artificial and external agitation or stirring about of the mass, is necessary not only in the common way of brewing for the malt-distillery, but also in that more expeditious way, now in use with some, of reducing the operations of brewing and fermenting to one, and grinding the malt to a fine meal, which is to be kept in the wash during the whole time, and even put into the still with it, and worked together. The stirring may be repeated to great advantage more than once in each operation, as at the affusion of every parcel of fresh water, in the common way, and at any shortly distant times in the short way, in which it is of greater service.

The action of fermentation works such a change in the body of the tincture or solution, called the wash, as to render it separable by distillation, into parcels of matter that are specifically different, and of a nature entirely foreign to what the same liquor would have yielded without the fermentation. See the article

DISTILLATION.

WASHING, in painting, in when a design, drawn with a pen or crayon, has some one colour laid over it with a pencil, as Indian-ink, bistre, or the like, to make it appear the more natural, by adding the shadow of prominences, apertures, &c. and by imitating the particular matters, whereof the thing is supposed to consist.

Thus they wash with a pale red to imitate brick and tile; with a pale indian-blue, to imitate water and slate; with green, for trees and meadows; with saffron or french-berries, for gold or brags; and with several colours for marbles. These washes are usually given in equal tints or degrees throughout; which are afterwards brought down and softened over the lights with fair water, and strengthened with deeper colours for the shadows.

Some colours are of such a gritty, sandy nature, that it is impossible to grind them so fine as some curious works require; therefore, in order to get forth the flour and fineness of the colour, it must be washed, which is done thus: Take what quantity of colour you please to wash, and put it into a vessel of fair water; stir it about till the water be all coloured therewith, and if any filth swim on the top of the water, scum it clean off; and, when you think the gross-

fest of the colour is settled at the bottom, then pour off that water into another earthen vessel, that is large enough to contain the first vessel full of water four or five times; then pour more water into the first vessel, and stir the colour that remains till the water be thick; and, after it is a little settled, pour the water also into the second vessel, and fill the first vessel again with water, stirring it as before; continue to do this till you find all the finest of the colour drawn forth, and none but coarse gritty stuff remain in the bottom; then let this water in the second vessel stand to settle till it is perfectly clear, and that all the colour be sunk to the bottom; which when you perceive, then pour the water clear from it, and reserve the colour in the bottom for use, which must be perfectly dried before you mix it with oil to work.

The colours thus ordered, are red lead, blue and green bice, verditer, blue, green smalt, and spanish brown, when you would cleanse it well from stones for some fine work, as also yellow oker, when you intend to make gold size of it.

WASHING of ores, the purifying an ore of any metal, by means of water, from earths and stones, which would otherwise render it difficult of fusion; this operation Cramer orders to be done as follows: Break the ore to a coarse powder in an iron mortar, weigh twenty or thirty de-imalstical centners of it, put them into the washing-trough, and pour some water upon them, that the ore may be thoroughly moist; then, have a vessel full of water, the diameter of which must be a little larger than the length of the trough; take the trough with the left-hand, by the top of the hinder part, and dipping it horizontally into the water, move it gently with the right-hand from the fore part of the trough, which is always to be made the shallower part of it, toward the hinder part, which is deeper; then take out the trough, and incline it a little on the fore-part, that the water may run out, and the heavier metallic part remain at the bottom; repeat this several times till the remains at the bottom of the trough are quite pure. If the stone in which the ore is lodged be too hard for powdering in its natural state, as the stinty and debased crystalline ones commonly are, the whole must be calcined, and quenched in cold water several times over, and

and afterwards powdered and washed in this manner: when it is thus washed, assay a centner of it, and from the bead of metal this yields, it will be easy to estimate the value of the ore.

WASHING, or **WASHES**, among goldsmiths, coiners, &c. are the lotions whereby they recover the particles of gold and silver out of the sweep, *i. e.* ashes, earths, sweepings, &c.

This is either performed by simply washing them again and again, or by putting them in the washing-mill.

To make one of these washes, they not only gather together the ashes of the furnaces, and sweepings of the work-houses, but they also break and pound the old earthen crucibles and the very bricks whereof the furnaces are built; little particles of gold, &c. being found to stick to them by the crackling natural to those metals, when in their last degree of heat.

These matters, being ground and mixed together, are put in large wooden-basons, where they are washed in several waters, which run off by inclination into troughs underneath; carrying with them the earth, and the insensible particles of the metals, and only leaving behind them the larger and more considerable ones which are visible to the eye, and taken out by the hand without more trouble.

To get out the finer parts gone off with the earth, they use quicksilver and a washing-mill. This mill consists of a large wooden trough, at the bottom of which are two metalline parts, serving as mill-stones; the lower being convex, and the upper, which is in form of a cross, concave.

A-top is a winch placed horizontally, which turns the upper piece round; and at bottom, a bung to let out the water and earth, when sufficiently ground.

To have a wash, then, the trough is filled with common water, into which they cast thirty or forty pounds of quicksilver, and two or three gallons of the matter remaining from the first lotion. Then turning the winch, they give motion to the upper mill-stone, which grinding the matter and the quick-silver violently together, the particles of gold and silver become the more easily amalgamated therewith. This work they continue for two hours, when, opening the bung, the water and earths run out, and a fresh quantity is put in.

The earths are easily passed thus through

the mill three times, and the same quantity of mercury usually serves all the three times. When there is nothing left in the mill but the mercury united with the gold or silver which it has amalgamated, they take it out, and washing it in divers waters, they put it in a ticken-bag, and lay it in a press to squeeze out the water, and the loose quicksilver; the remaining quicksilver they evaporate by fire, in a retort, or an alembic. The metal which remains they refine with lead, or part it with aqua fortis. See **ASSAYING**.

WASP, in zoology, the black apis, with four yellow circles on the body. See the article **APIS**.

WASP-FLY, the vespæform asilus, with the antennæ longer than the head. See the article **ASILUS**.

WAST, or **WASTE**, *vastum*, in law, has divers significations. It is used for a spoil, made either in houses, woods, lands, &c. by the tenants for life, or for years, to the prejudice of the heir, or of him in reversion or remainder.

Upon this the writ of waste is brought for the recovery of the thing wasted, and treble damages.

WASTE of the forest, is properly where a man cuts down his own woods within the forest, without licence of the king or lord chief justice in eyre.

WASTE is also taken for those lands which are not in any man's occupation, but lie common.

They seem to be so called, because the lord cannot make such profit of them, as of his other lands, by reason of the use others have thereof, for passing to and fro. Upon this none may build, cut down trees, dig, &c. without the lord's licence.

WASTE of a ship, is that part of her between the main and foremast.

WASTE-BOARDS, are boards sometimes set upon the side of a boat, or other vessel, to keep the sea from breaking into her.

WASTE-CLOTHS, in a ship of war, the same with fights. See the article **FIGHT**.

WATCH, in the art of war, a number of men posted at any passage, or a company of the guards who go on the patrol. See the articles **GUARD** and **PATROL**.

Also a person posted as a spy in any place, to have an eye thereto, and to give notice of what passes. A watch is properly intended for the apprehending of rogues in the night, as ward is for the like purpose in the day time; and for default to watch and ward, the township, &c. is punishable.

punishable. It is ordained, that in all towns between Michaelmas day and the day of Ascension, there shall be night-watches kept in each city, with six men at every gate, and six or four in a town. Also every borough is to have twelve men to watch therein, or otherwise in proportion to the number of the inhabitants in the place, from sun-set to sun-rising, who are to arrest strangers suspected, and disturbers of the peace, &c. and may justify the detaining of them till the morning; or they may deliver them to the constable, in order to be carried before a justice.

At sea, the term watch denotes a measure or space of four hours, because half the ship's company watch, and do duty in their turns, so long at a time; and they are termed star-board watch, and larboard-watch.

WATCH is also used for a small portable movement or machine for the measuring of time; having its motion regulated by a spiral spring. See the article **SPRING**. Watches, strictly taken, are all such movements as shew the parts of time; as clocks are such as publish it, by striking on a bell, &c. But, commonly, the name watch is appropriated to such as are carried in the pocket, and clock to the large movements, whether they strike or not. See the article **CLOCK**.

The several members of the watch part are, 1. The ballance, consisting of the rim, which is its circular part; and the verge, which is its spindle, to which belong the two pallets or levers that play in the teeth of the crown-wheel. 2. The potence, or pottance, which is the strong stud in pocket-watches, whereon the lower pivot of the verge plays, and in the middle of which one pivot of the ballance-wheel plays; the bottom of the potence is called the foot, the middle part the nose, and the upper part the shoulder. 3. The cock, which is the piece covering the ballance. 4. The regulator or pendulum spring, which is the small spring in new pocket-watches, underneath the ballance. 5. The pendulum, whose parts are the verge, pallets, cocks, and the bob. 6. The wheels, which are the crown-wheel in pocket-pieces, and swing-wheel in pendulums, serving to drive the ballance or pendulum. 7. The contrate-wheel, which is that next the crown-wheel, &c. and whose teeth and hoop lie contrary to those of other wheels; whence the name. 8. The great or first wheel, which is

that the fusee, &c. immediately drives: after which are the second wheel, third wheel, &c. 9. Lastly, between the frame and dial-plate, is the pinion of report, which is that fixed on the arbor of the great wheel, and serves to drive the dial-wheel, as that serves to carry the hand. See the article **BALLANCE**, &c.

For the theory and calculation of watch-work, see the article **CLOCK**.

Spring or pendulum WATCHES, are pretty much upon the same principle with pendulum clocks, whence their denomination. If a pendulum describing little arches of a circle make vibrations of unequal lengths, in equal times, it is by reason it describes the greater with a greater velocity. For the same reason a spring put in motion, and making greater or less vibrations, as it is more or less stiff, and as it has a greater or less degree of motion given it, performs them nearly in equal times. Hence, as the vibrations of the pendulum had been applied to large clocks to rectify the inequality of their motions; so to correct the unequal motions of the ballance of watches, a spring is added, by the isochronism of whose vibrations the correction is to be effected.

The spring is usually wound into a spiral, that, in the little compass allotted it, it may be as long as possible, and may have strength enough not to be mastered and dragged about by the inequalities of the ballance it is to regulate. The vibrations of the two parts, *viz.* the spring and ballance, should be of some length; only so adjusted, as that the spring, being more regular in the length of its vibrations than the balance, may on occasion communicate its regularity thereto.

The invention of spring or pocket watches, is owing to the artills of the present age. It is true, we find mention made of a watch presented to Charles V. in the history of that prince; but this in all probability was no more than a kind of clock to be set on a table. some resemblance whereof we have still remaining in the ancient pieces made before the year 1670.

In effect, it is between Dr. Hooke and Mr. Huygens, that the glory of this excellent invention lies, but to which of them it properly belongs, is greatly disputed; the English ascribed it to the former, and the French, Dutch, &c. to the latter. Mr. Deham, in his artificial clock-maker, says plainly that Dr. Hooke

was the inventor; and adds, that he contrived various ways of regulation. One way was with a load-stone. Another with a tender straight spring, one end whereof played backwards and forwards, with the ballance; so that the ballance was to the spring, as the bob to a pendulum; and the spring, as the rod thereof. A third method was with two ballances, of which there were divers sorts; some having a spiral spring to the ballance for a regulator, and others without. But the way that prevailed and continues in mode, was with one ballance and one spring running round the upper part of the verge thereof. Though this has a disadvantage which those of two springs, &c. were free from, in that a sudden jerk or confused shake will alter its vibrations, and put it in an unusual hurry. The time of these inventions was about the year 1658, as appears, among other evidences, from an inscription on one of the double-ballance watches presented to king Charles II. *viz.* Robert Hooke invent. 1658. T. Tompion fecit, 16. The invention presently got into reputation, both at home and abroad; and two of them were sent for by the dauphin of France.

Soon after this, Mr. Huygens's watch, with a spiral spring, got abroad, and made as great noise in England, as if the longitude could be found by it. It is certain, however, that his invention was later than the year 1673, when his book *de Horol. Oscillat.* was published, wherein he has not one word of this, though he has of several other contrivances in the same way.

Astronomical WATCH, a machine invented by Mr. Neale, for solving several astronomical problems. It has two glasses; that in the front covers a dial-plate, as in common watches; the other on the back-side, covers a plate forming a segment of a globe, on which are drawn twenty-four meridian lines, with the names of so many countries, at 15° difference of longitude from each other. (See plate CCXCVII. fig. 1.) This plate makes an entire revolution in twenty-four hours; and, consequently, every country thereon passes by the sun, represented by A. Round this plate is a circle divided into 24 hours, also at rest; by means of which, when the moveable plate is made to correspond to the true time, shewn by the hands on the common side, the time

of day or night, at the several countries specified, is shewn by the hour-circle. Round the moveable plate, and between it and the circle of hours above described, moves a narrow circle, on which is engraved the moon's age; and over 29½ is placed an ivory-ball, B, representing the moon: and at right angles each way, are placed two pins, C, and D, one eastward, and the other westward; by means of which, the time of the moon's rising, southing and setting, at those different places, is shewn in a very entertaining manner. Several other useful astronomical problems may also be solved thereby.

Striking WATCH, one which, besides the common watch-work for measuring time, has a clock-part for striking the hours; so that, properly speaking, they are pocket-clocks. See the article *CLOCK*.

Repeating WATCH, one that by only pulling a string, pushing in a pin, &c. repeats the hour, quarter, or minute, at any time of the day or night.

WATCHING, or *WAKEFULNESS*, *insomnia*, in medicine, is produced by too great a determination of the nervous fluid, to the organs of the senses; whereby these organs are prepared to receive, readily, any impressions from external objects, which they propagate to the brain, and furnish the soul with divers occasions of thinking. This extraordinary flux of spirits may have two causes: for, 1. The sensible objects may strike the organ with too much force. In which case, the animal spirits being violently agitated, and those agitations continued by the nerves to the brain, they give a like motion to the brain itself; the necessary consequence of which is, that the animal must wake. Thus, a loud shriek, pains, headach, gripes, coughing, &c. cause waking. And the soul's being oppressed with cares, or deeply engaged in thinking, contributes to the same, since, as it acts by the ministry of the spirits, any cares or meditations that keep them in motion, must produce watchfulness. Of this kind are those inveterate wakings of melancholic persons, some of whom have been known to pass three or four weeks without a wink of sleep. See the article *SLEEP*.

2. The other cause is in the spirits themselves, which have some extraordinary disposition to receive motion, or to persist in it; as from their too great heat, or that of the brain, in fevers, &c.

Hence

Fig. 1. Astronomical WATCH.



Fig. 2. WAVE.

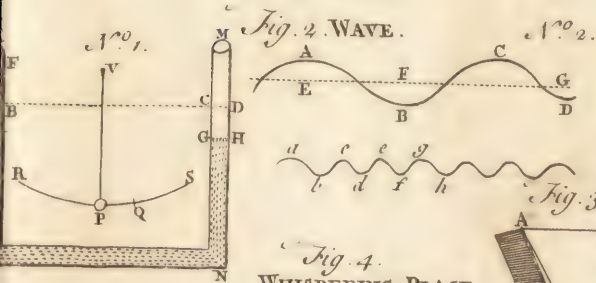


Fig. 3. WEDGE.

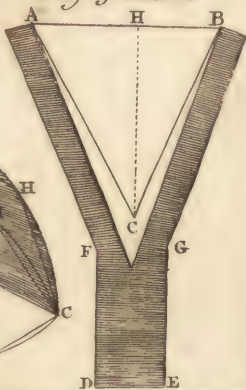
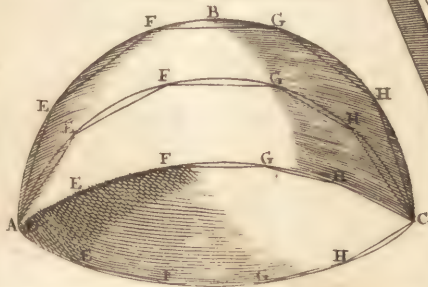


Fig. 4. WHISPERING-PLACE.



7.5. VOIDER.





Hence it is, that the disorder is most frequent in summer, in the heat of youth, &c. See the article **HEAT**.

Long fasting has the same effect; the want of food subtilizing the spirits, and drying the brain. The same is likewise an ordinary symptom in old age, by reason the pores of the brain and nerves having been much widened by the continual passage of spirits for a great number of years, the spirits now pass and re-pass through them with too much ease, and need not any extraordinary motion to keep the mind awake.

There are instances of waking forty-five nights successively; and we even read of a melancholy person, who never slept once in fourteen months. Such washings usually degenerate into madness.

When the cause is known, it must be removed, if possible, and the irritated spirits must be appeased with emulsions, especially of poppy-seeds, or with the thebaic tincture, or theriaca, and other opiates in general, not neglecting the original diseases. In fevers, a moist softening diet is beneficial; as also preparations of barley, emulsions of poppy-seeds and almonds, decoctions of scorzonera-roots, almond-cream, and winter-flummary used as aliment: likewise tea made of cowslip-flowers, and gentle laxatives. When the patient is restless and wakeful the night before a crisis, no hypnotics should be given. See the article **FEVER**. When there is no other disease, the patient should shun all care and intense thinking, especially in the evening: he should also use exercise, and eat light suppers. If it is caused by pains, they should be appeased by antispasmodics, things which temperate, and diaphoretics; and if these will not do, mild opiates must be added. In old persons, all care and solitude must be banished; the mind should be quiet, and the moderate use of generous wine may be allowed in the evening; likewise medicines of amber and mulk will be proper, and confectio alkermes or theriaca with wine. The drinking of hot water, and principally coffee, must be forbid after dinner.

WATER, *aqua*, in physiology, a simple, fluid, and liquid body, reputed the third of the four vulgar elements. Sir Isaac Newton defines water to be a fluid salt, volatile and void of taste; but this definition Boerhaave sets aside, in as much as water is a menstruum or dissolvent of salts and saline bodies, which does not

agree with the notion of its being a salt itself; for we do not know of any salt that dissolves another. This last mentioned philosopher, therefore, defines water, a very fluid, scentless, tasteless, transparent, colourless liquor, which turns to ice with a certain degree of cold. See the article **FLUID**.

Though water be defined a fluid, it is a point controverted among philosophers whether fluidity be its natural state, or the effect of violence. We sometimes find it appear in a fluid, and sometimes in a solid form; and as the former, in our warmer climate, is the more usual, we conclude it the proper one; and ascribe the other to the extraneous action of cold. Boerhaave, however, asserts the contrary, and maintains water to be naturally of the crystalline kind; since wherever a certain degree of fire is wanting to keep it in fusion, it readily grows into a hard glebe under the denomination of ice. Mr. Boyle is of the same opinion. Ice, he observes, is usually said to be water brought into a preternatural state by cold; but with regard to the nature of things, and setting aside our arbitrary ideas, it might as justly be said that water is ice preternaturally thawed by heat. If it be urged, that ice left to itself will, upon the removal of the freezing agents, return to water; it may be answered, that, not to mention the snow and ice which lie all summer on the Alps, and other high mountains, even in the torrid zone, we have been assured, that in some parts of Siberia, the surface of the ground continues more months in the year frozen by the natural temperature of the climate, than thawed by the heat of the sun; and a little below the surface of the ground, the water which chanced to be lodged in the cavities there, continues in a state of ice all the year round; so that when, in the heat of the summer, the fields are covered with corn, if you dig a foot or two deep, you shall find ice and a frozen soil. See the articles **ICE**, **FREEZING**, &c.

Water is generally divided into salt and fresh, with regard to the ocean and rivers. But, according to Dr. Shaw, it seems divisible into as many different species, as the earth is into beds. Thus there are mineral waters of various kinds, according to the mineral substance they run over, and become impregnated with; tho' this impregnation sometimes happens in the way of vapour and exhalation.

Water, therefore, in the general, may be as mixed a body as earth, and perhaps neither of them naturally exists in any considerable purity. See SEA WATER, MINERAL-WATER, EARTH, VAPOUR, EXHALATION, &c.

In a general analysis of water, the doctor found, 1. That common warm-water throws up numerous little bubbles, and explodes, in the exhausted receiver of the air-pump; for which reason water contains what may, by way of distinction, be called æther or spirit. 2. It contains a merely aqueous part, distinct from æther and the sediment, as appears from distilled common water. 3. It contains a dry solid matter, which is either earthy or saline, as appears upon a full evaporation, and from the insides of tea kettles, which, after long use, are lined with a stony matter that beats off in flakes or crusty pieces. See the articles AIR, DISTILLATION, &c.

Water is not only contained in the earth as in a reservoir, but likewise floats in the atmosphere. In both cases it is actuated, rarified, and put in motion by heat, so as to prove instrumental in producing effects. Thus it produces clouds, rains, dews, springs and rivers. It refreshes the earth, recruits vegetables, and is the support of fish and other animals by conveying nutriment to all their parts. It is also the first and immediate instrument of fermentation, putrefaction, corruption, and change in all vegetable and animal subjects. See ATMOSPHERE, CLOUD, RAIN, DEW, &c.

But the nature and uses of water, will best appear from the following experiments. 1. That water is contained in many solid bodies, and to appearance in dry bodies, was proved thus: a piece of the hardest and driest bone being procured, and distilled in an earthen retort, with degrees of fire, a very large proportion of water, along with much oil and volatile salt, was obtained: whence it appears, that animal matters are resolvable into the four chemical principles, water, oil, salt and earth. This experiment holds true even of the oldest harshorn, the driest and hardest woods, earths and pulverized stones. Whence it also appears, that water may be concealed in solid bodies, and make a constituent part thereof: for it is not meant that water insinuates itself into the superficial pores of bodies, such as wood, skins, &c. so as to swell them in moist weather, and

leave them shrunk in dry; but that it remains permanently intermixed as an essential ingredient, or as a part of solid bodies. See the article BODY.

2. That water may be collected from the driest air, or in the hottest climate, was proved by the following experiment. Half a pint of common water was put into a cylindrical glass wiped perfectly dry on the outside; then was added to the water two ounces and three quarters of pulverized and dry sal ammoniac; these were stirred briskly together, whereupon the water floating in the external air was, by the coldness thus produced, condensed on the outside of the glass as the salt dissolved within, and trickled down in small veins, into the shallow basin set underneath to receive it. This experiment holds in all climates and places of different heights where it has been tried; whence by the law of induction we may make it universal; till any contradictory instance appears. Thus, therefore, it may hold in the most parched countries, and hottest seasons, so as to afford an agreeable method of cooling potable liquors, and rendering them more refreshing. For if the containing glass of the salt and water be set in any liquor, the liquor will be cooled thereby; and if any considerable improvement could be made in the contrivance, it is observed, that it might in some measure serve to supply the thirsty traveller in parched deserts, and the sailors with fresh water at sea. See SEA-WATER.

3. To determine the proportion of water contained in an assigned portion of the atmosphere, we are directed by the following experiment. Having by means of the air pump, and an exact pair of scales, found the weight of a certain quantity of air contained in a large glass-vessel, there was included therein a certain known weight of well-dried potential cautery, whose property it is powerfully to attract the moisture of the air. This vessel was kept close stopp'd for several hours; during which time, the potential cautery was grown wet, in which state being weighed again, it was found considerably to increase; which must be either owing to the water attracted out of the air in the glass, or to a condensation of the air itself into an aqueous fluid; for such a fluid might now by distillation be obtained from the matter thus run per deliquium. It is observed that there is room to suspect, that if this experiment

periment were made in perfection, a weight of water almost equal to that of the air included in the vessel, might be thus obtained, which might prove a very extraordinary discovery, and shew what some have endeavoured to prove, that the matter of common air, is little more than water. See AIR and ATMOSPHERE.

4. That an earthy substance is naturally contained in water, was proved as follows. Three several glasses were filled with pure rain-water, spring water, and Thames water, and suffered to stand, close covered, for some days before they were exhibited. There was an earthy sediment then deposited in all the three, but most in the Thames water, the sediment whereof was not only larger, but also more foul and muddy than in the rain water; though here, also, it was dirty, perhaps, because not carefully collected; whereas, in the pump-water, it was white, scaly, flaky, and shining, like fine spangles of talc. This experiment is also univereal, so far as it has been tried with care, and holds true of the waters of all species and all countries, particularly in those called mineral waters, from which an earthy substance may usually be precipitated by art, in a considerable proportion. See the article PYRMONT WATER.

Certain experiments carefully made, and repeated, shew that the terrestrial matter naturally contained in water, has a principal share in the growth and increase of vegetables; all the plants that thrive in water appearing to enlarge their bulk in proportion to the earthy matter they draw from the water. Whence pure elementary water, seems but a kind of vehicle to convey this nutrimental or substantial part, and deposite it in the vessels through which the water moves, in order to its general exit at the surface of vegetables. But we are not here to exclude the instrumental efficacy of the two other elements, fire and air. And this appearing to be the general office of water in the whole animal and vegetable kingdoms, viz. the conveyance or distribution of the alimentary matter to all their parts, it may be proper to consider its physical properties, which would wonderfully fit it for this office. See the article VEGETATION.

The figure of its component parts appears to be smooth and spherical, like those of quicksilver; whence it becomes extremely moving and penetrating.

Thus it readily enters the pores of wood, leather, skins, chords, musical strings, &c. thus likewise it becomes capable of moving and agitating particles of matter less active than itself, and so proves the more immediate physical agent of fermentation, putrefaction, solution, &c. and thus it also conveys earthy and saline matters through our filters of paper, stone, &c. and even raises some proportion of them in distillations. Its particles likewise appear to be extremely minute, and so have a large share of surface. Hence water is admirably fitted for a solvent, or for readily entering the pores of salts, and coming into full contact with all their particles; and thus it will pass where air cannot, on account of its moisture, or lubricating power, whereby it fastens mucilaginous matters, and will therefore soak through the close pores of a bladder.

The specific gravity of water, and consequently its goodness by its lightness, are to be directly judged of by the hydrostatical ballance. This experiment is a good substitute for several other ways of examining the purity and goodness of waters, both common and mineral; for it appears by numerous instances, that light waters are, *ceteris paribus*. the best, purest, and wholesomest. That water is accounted best and wholesomest which is not only the lightest and freest from earthy sediment, but that which is the most spiritous; and these properties are usually found in pure rain-water; that being naturally distilled from the ocean and rivers, or by the heat of the sun raised up into the atmosphere, from whence it is returned much after the manner of common distillation. See the articles SPECIFIC GRAVITY, HYDROSTATICAL Ballance, CHALYBEATE Water, &c.

From the preceding, and other experiments of Dr. Shaw, made upon water, he deduces the following axioms and canons. First we have seen, That water is naturally contained in some of the driest and hardest bodies, and in the driest air. 2. That itself naturally contains an earthy substance. 3. That it is the proper menstruum of salts, dissolving more of one, and less of another. 4. That one good sign of its purity and wholesomeness is levity. 5. That the ingredients of a mineral water may be discovered by chemical expedients: and, 6. That mineral-waters are imitable by art from such discovery. See MINERAL

WATER, PYRMONT-WATER, &c.

Secondly, That water is of infinite use in all the works both of nature and art, as without it there could be no generation, nutrition, or accretion performed in any of the animal, vegetable, mineral, marine, or atmospherical regions. The blood could not flow in the veins, the sap in the vessels of vegetables, nor the particles of minerals concrete and grow together, without water. It is this that makes the largest part of our blood, our drink, and other aliments. There could be no corruption, fermentation, or dissolution carried on without it, no brewing, no distilling, no wines, no vinegar, no spirits, made without it. See the articles **GENERATION, NUTRITION, ACCRETION, &c.**

Thirdly, That we meet with water under an infinite variety of forms, and in an infinite variety of bodies, as that of air, vapour, clouds, snow, hail, ice, sap, wines, blood, flesh, bone, horn, stone, &c. through all which it seems to pass unaltered, as an agent or instrument that suffers no alteration by re-action, but remains capable of resuming the form of water again upon occasion. See the articles **SNOW, HAIL, &c.**

Fourthly, That water in its own common state appears to be a combination of all the elements together, as containing a quantity of fire, which keeps it fluid, a quantity of air, and a quantity of earth; whence it can be no wonder that water, alone, as it appears to the senses, should suffice for vegetation in some cases, where little earth is wanted, or for supporting animal and mineral life, where no great degree of nutriment is required; and hence it proves a gluten, or cement to some bodies, and a solvent to others; thus it consolidates brick, plaster of Paris, stone, bone, &c. but dissolves salts, and subtile earths approaching to salts, and becomes the instrumental cause of their action. See **ELEMENT, &c.**

Fifthly, That water conveys nourishment, or a more fixed and solid matter to the parts of vegetables, where having deposited it, the finer fluid perspires into the atmosphere, which gives us the physical cause of the dampness and unwholesomeness of woody countries, as they remarkably find in America. For all large vegetables act after the manner of forcing pumps, and continually draw in large quantities of water at their roots, and discharge it at their leaves, which

intimates a method of collecting water in dry countries, and likewise of making salt-water fresh. See the article **VEGETATION, SEA-WATER, &c.**

Sixthly, That the water in passing thro' plants, after having deposited its more terrestrial part, does not always go off pure, but impregnated with the finer effluvia, or more subtile particles of the vegetable; thus making an atmosphere round every plant, according to its nature odoriferous or otherwise, which supplies us with a rule for procuring the odoriferous waters of vegetables by distillation.

Seventhly, That the particles, not fine enough to go off thus along with the water, are left behind upon the surface of the leaves and flowers of plants, being now thickened or strained from their moister parts, and remaining in the form of honey, manna, gums, balsams, &c. according to the nature of the vegetable. And hence appears the physical cause of plants proving more odoriferous and sweet when the weather is both warm and moist, as immediately after a summer's shower. See the articles **HONEY, MANNA, GUM, &c.**

Eightly, That the chemical operator should form to himself an hygrometer for the service of his laboratory to determine the proportion of water at all times contained in the air, which continually mixes with his preparations, differently augments their weight, and promotes or hinders many of his operations. See **LABORATORY and HYGROMETER.**

Ninthly, That pure water makes the largest part of mineral waters, where it is impregnated as a menstruum, with several ingredients that it dissolves or drinks up in its passage through the earth.

Tenthly and lastly, the preceding enquiry affords considerable light for discovering practicable ways of making sea-water fresh and potable, and of preparing waters by art, so as to render them fitter for the common economical uses, and the service of many particular arts, as medicine, pharmacy, chemistry, brewing, distilling, &c.

Water is of the utmost use in divers of the mechanical arts and occasions of life, as in the motion of mills, engines, fountains, and other machines, the construction of all which, subservient thereto, or founded thereon, as siphons, pumps, &c. make the subject of hydraulics. See the

the articles **MILL, ENGINE, FOUNTAIN, MACHINE, HYDRAULICS, &c.**

The laws, properties, &c. of this fluid, with respect to the foreaid uses, as its motion, gravitation, pression, elevation, action, momenta and velocities, &c. which make the subject of hydrostatics, may be seen under the article **FLUID** and **HYDROSTATICS**.

For the water-poise, or that instrument which serves to measure the gravity, density, velocity, &c. of water, see the article **HYDROMETER**.

For the ascent of water in capillary tubes, see the article **CAPILLARY**.

For an account of the water-clock, the water-level, the water-organ, &c. See **CLEPSYDRA, LEVEL, ORGAN, &c.**

WATER, in hydrography, and geography, is a common or general name, applied to all liquid transparent bodies, gliding or flowing on the earth, in which sense water and earth are said to constitute our terraqueous globe. See **EARTH**.

In this sense, water is distinguished with regard to the places where it is found, into sea-water, rain-water, spring-water, well-water, cistern-water, lake water, morass-water, &c. See the articles **SEA, RAIN, RIVER, SPRING, WELL, &c.**

For the periodical changes to which the water of the sea is liable, see the articles **TIDES, FLUX, EBB, &c.**

WATER, in medicine, pharmacy, &c. called also artificial and medicated waters, are a kind of liquors procured or prepared by art from divers bodies, principally of the vegetable tribe, having various properties, and serving for various purposes. These waters are either simple, or compound; simple-waters are those procured from some one vegetable body, the intention of which is to draw out the virtues of the herb, seed, flower, root, or the like, so as it may be more conveniently given in that form than any other. The means whereby this separation is effected, are either evaporation, infusion, decoction, or distillation. See **EVAPORATION, INFUSION, &c.**

The simple waters of chief virtue are the following ones, *viz.* dill-water, angelica-water, mint-water, rosemary-water, orange flower-water, black-cherry-water, parsley-water, camomile water, penny-royal-water, fennel-water, damask rose-water, hyssop-water, rue-water, juniper-water, elder-water, lovage-water, carminative-water, &c. for the virtues of each whereof we refer the reader to those

ascribed to the several plants, or other bodies from whence the water is procured, which may be found under their proper heads in the course of this work.

Compound-waters, or those wherein several ingredients are used, are very numerous, and make a large article in commerce; some prepared by the apothecaries, according to the dispensatory prescriptions, for medicinal uses; others by the distillers, to be drank by way of dram; and others by the perfumers, &c. They are distinguished by different epithets, &c. in respect either of the specific virtues of the waters, or the parts of the body for the cure whereof they are intended, or the diseases they are good against, or the ingredients they are compounded of, or their different uses, &c.

The most considerable among the class of compound-waters, are alexipharmic or alexiterial-waters, such as treacle-water, plague-water, milk-water, poppy-water, &c. alum-water, angelica-water, anniseed-water, apricot-water, aromatic-water, arthritic-water, bryony-water, carduus-water, water of separation, or depart, caustic-water, cephalic-water, chalybeat-water, cinnamon-water, clary-water, clove-water, cordial-water, cosmetic-water, gentian-water, gum-water, hepatic-water, honey-water, hungary-water, hysteric-water, iced or frozen-water, imperial-water, lime-water, aqua-mirabilis, or the wonderful-water, nephritic-water, ophthalmic-water, orange-water, peach-water, poppy-water, pyony-water, rose-water, scordium-water, specific-water, splenetic-water, stomachic-water, styptic-water, treacle-water, vulnerary-water, &c.

The uses and preparations of most of these, and several others, may be seen as they are arranged under their respective names throughout the course of this work; but as these waters are exceeding numerous, and the manner of making them, is not always the same, we must refer the chemical or medical reader to the dispensaries, wherein he will find, that every one gives his own method as the best one.

We have only three general remarks to add, with regard to those intended for drinking. 1. That such wherein any thing is infused, as bruised fruits, pounded herbs, &c. or ground spices, must be always passed through a filtre, to make them finer and purer. 2. That those made with brandy, or spirit of wine,

are

are usually distilled after mixing their ingredients, which renders those liquors exceeding strong and dangerous. 3. That the waters which take their name from particular things, as cinnamon, &c. have often some other ingredients, joined with them, according to the taste or smell required.

WATER, in anatomy, is applied to divers liquors or humours in the human body, such is the aqua phlegmatica, which is a soft serous humour, contained in the pericardium, and wherein the heart swims. See PERICARDIUM.

Holy WATER, a water prepared every Sunday in the romish church, with divers prayers, exorcisms, &c. used by the people to cross themselves withal at their entrance to and going out of, church; and pretended to have the virtue of washing away venial sins, driving away devils, preserving from thunder, dissolving charms, securing from, or curing diseases, &c. Many of the reformed take the use of holy-water to have been borrowed from the isstral water of the antient Romans. See LUSTRATION.

WATER ORDEAL, or TRIAL, among our ancestors, was of two kinds, by hot and by cold, water. Trial or purgation, by boiling or hot water, was a way of proving crimes, by immersing the body, or the arm, in hot water, with divers religious ceremonies. In the judgment by boiling water, the accused, or he who personated the accused, was obliged to put his naked arm into a caldron full of boiling water, and to draw out a stone thence placed at a greater or less depth, according to the quality of the crime. This done, the arm was wrapped up, and the judge set his seal on the cloth, and at the end of three days they returned to view it, when if it were found without any scald, the accused was declared innocent. The nobles or great personages purged themselves thus, by hot water, and the populace, by cold water. The trial, or purgation, by cold water, was thus: after certain prayers and other ceremonies, the accused was swaddled, or tied up, all in a peloroon or lump, and thus cast into a river, lake, or vessel, of cold water, where if he sunk he was held criminal, if he floated, innocent. In the levitical law, we find mention made of water which served to prove, whether or no a woman was an adulteress; the formula, as it was performed by the priest, may be seen in the

fifth chapter of the book of Numbers. **WATER**, among jewellers, is properly the colour or lustre of diamonds and pearls. The term, though less properly, is sometimes used for the hue or colour of other stones. See DIAMOND and PEARL.

WATER-BAILIFF, is an officer in sea-port towns, appointed for the searching of ships; and in London, the water-bailiff hath the supervising and search of fish, brought thither; and the gathering of the toll arising from the Thames; his office is likewise to arrest men for debt, &c. or other personal or criminal matters upon the river Thames.

WATER-Beetle, *Dytiscus*, in zoology. See the article DYTISCUS.

WATER-SCORPION, *nepa*, in zoology. See the article NEPA.

WATER-BORNE, in the sea-language. A ship is said to be water-borne, when she is, where there is no more water than will barely bear her from the ground; or when lying even with the ground, she first begins to float or swim.

WATER-COLOURS, in painting, are such colours as are only diluted and mixed up with gum-water, in contradistinction to oil-colours.

The use of water-colours makes what we call limning, as that of oil-colours does painting, properly so called. See the articles COLOUR and LIMNING.

Dead WATER, in the sea-language, is the eddy-water that follows the stern of a ship, not passing away so fast as that which slides by her sides.

WATER, or SEA-GAGE. See GAGE.

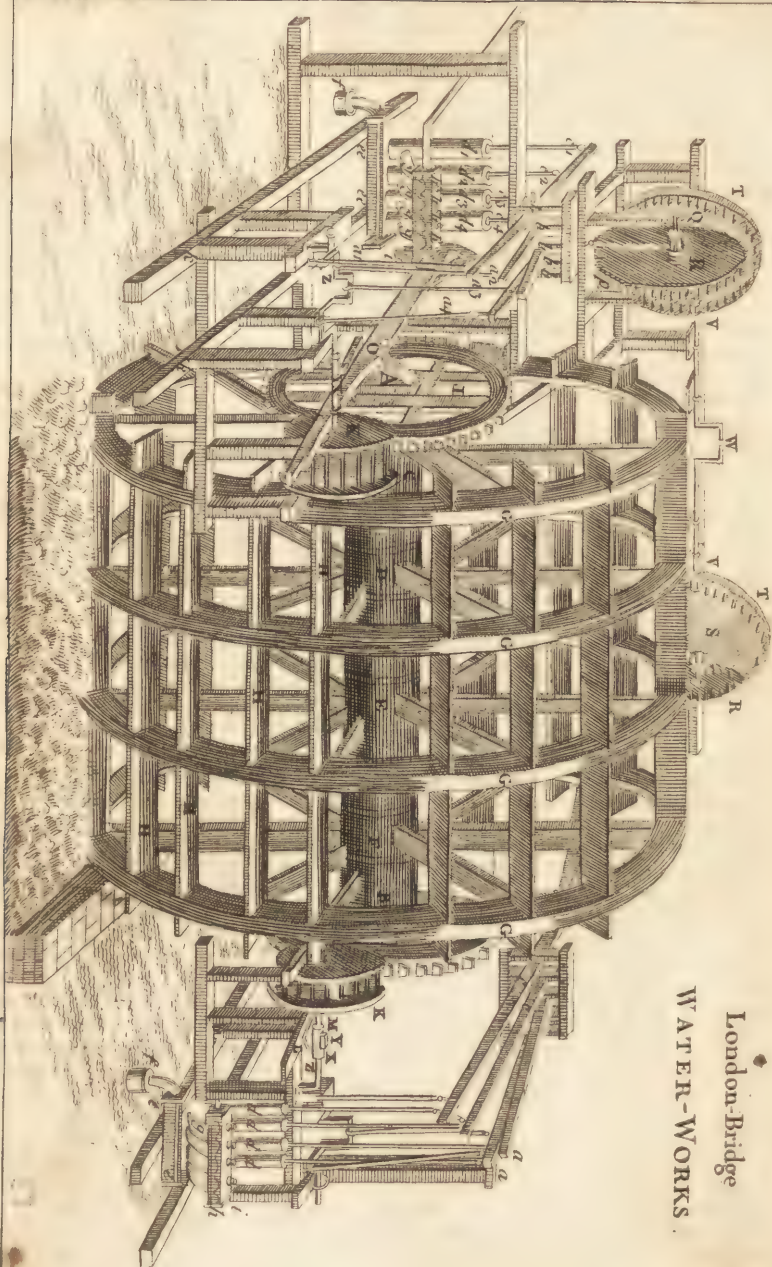
WATER-GANG, a channel cut to drain a place by carrying off a stream of water.

WATER-LINE of a ship, a line which distinguishes that part of her under water from that above, when she is duly laden.

WATER-MEASURE. Salt, sea-coal, &c. while aboard vessels in the pool or river, are measured with the corn-bushel heaped up; or else five striked pecks are allowed to the bushel. This is called water-measure. See the article MEASURE.

WATER MEN, are such as row in boats, or ply on the river Thames, in the government of whom the lord-mayor of London, and court of aldermen there, had always great power. They still have the appointing of their fares, the taking more than which, makes them liable to a fine of 40s. and half a year's imprisonment. The fares assessed are, from London-bridge to Limehouse, Ratcliff-cross, &c. oars, 1s. scullers, 6d. to Wapping-dock, Rother-

London-Bridge
WATER-WORKS





Rotherhith church-stairs, &c. oars, 6 d. scullers 3 d. from either side of the water above the Bridge to Lambeth, and Vauxhall, oars, 1 s. scullers, 6 d. all the stairs between London-bridge and Westminster, oars, 6 d. scullers, 3 d. Watermen's boats ought to be twelve feet and a half in length, and four and a half in breadth; and no apprentice to any waterman shall take upon him the care of a boat till he is sixteen years of age, if a waterman's son; and seventeen, if a landman's son, unless he has worked with some able waterman two years, &c. No tilt-boat, or row-berge, &c. may take in above thirty-seven passengers, or three more by the way; nor any boat above eight passengers, and two by the way, else they forfeit 5 l. for the first offence, and 10 l. for the second, &c. and if any person be drowned when a greater number are taken in, the waterman is declared guilty of felony, and may be transported, &c.

WATER-SPRING, T, a young sprig which springs out of the root or stock of a tree.

WATER-SHOT, in the sea-language, a sort of riding at anchor when a ship is moored neither cross the tide, nor right up and down; but quartering betwixt both.

WATER-TABLE, in architecture, a sort of ledge left in stone, or brick-walls, about eighteen or twenty inches from the ground, from which place the thickness of the wall begins to abate. See **WALL**.

WATER-WAY, in a ship, is a small ledge of timber, lying fore and aft on the deck, close by her sides, to keep the water from running down there.

WATER-WHEEL, an engine for raising water in great quantity out of a deep well. See *Persian* **WHEEL**.

WATER-WORKS, in general, denote all manner of machines moved by, or employed in raising or sustaining water; in which sense, water-mills of all kinds, sluices, aqueducts, &c. may be called water-works. See **MILL**, &c.

The term water-works, however, is more particularly used for such machines as are employed only in raising water.

We shall begin with the description of that at London-bridge, which is moved by the common tide-water of the river Thames. AB (plate CCXCVIII.) the axle-tree of the water-wheel, is nineteen feet long, three feet diameter, in which C, D, E, F, are four sets of arms, eight in each place, on which are fixed G, G, G, G, four rings, or sets of felloes, in diameter

twenty feet; and the floats H, H, H, four-teen feet long, and eighteen inches deep, being about twenty-six in number.

The wheel lies with its two gudgeons, or center-pins A B, upon two brasses in the pieces M N, which are two great levers, whose fulcrum, or prop, is an arched piece of timber L: the levers being made circular on their lower sides to an arch of the radius M O, and kept in their places by two arching studs fixed in the stock L, through two mortises in the lever M N. The wheel is, by these levers, made to rise and fall with the tide, which is performed in this manner: the levers M N are sixteen feet long; from M, the fulcrum of the lever, to O the gudgeon of the water-wheel, six feet; and from O to the arch at N, ten feet. To the bottom of the arch N is fixed a strong triple chain P, made after the fashion of a watch-chain, but the links arched to a circle of one foot diameter, having notches, or teeth, to take hold of the leaves of a pinion of cast iron Q, ten inches diameter, with eight teeth in it moving on an axis. The other loose end of this chain has a large weight hanging at it, to help to counterpoise the wheel, and preserve the chain from sliding on the pinion. On the same axis is fixed a cog-wheel R, 6 feet diameter, with 48 cogs. To this is applied a trundle, or pinion S, of six rounds, or teeth; and upon the same axis is fixed T, a cog-wheel of fifty-one cogs, into which the trundle V, of six rounds, works; on whose axis is a winch or windlass W, by which one man, with the two windlasses, raises or lets down the wheel, as there is occasion. And because the fulcrums of these levers M N are in the axis of the trundle K, viz. at M or X, in what situation soever the wheel is raised or let down, the cog-wheel I, I, is always equidistant from M, and works or geers truly. By means of this machine the strength of an ordinary man will raise about fifty ton weight.

I, I, is a cog-wheel fixed near the end of the great axis, eight feet diameter, and 44 cogs working into a trundle K, of $4\frac{1}{2}$ feet diameter, and 20 rounds, whose axis or spindle is of cast iron 4 inches in diameter, lying in brasses at each end, as at X.

ZZ is a quadruple crank of cast iron, the metal being six inches square, each of the necks being turned one foot from the

center,

center, which is fixed in brasses at each end in two head-stocks fastened down by caps. One end of this crank at *Y* is placed close abutting to the end of the axle-tree *X*, where they are at those ends six inches diameter, each having a slit in the ends, where an iron wedge is put, one half into the end *X*, the other half into *Y*, by means of which the axis *X* turns about the crank *Z Z*.

The four necks of the crank have each an iron spear, or rod, fixed at their upper ends to the respective libra, or lever, *a 1*, *2*, *3*, *4*, within three feet of the end. These levers are twenty-four feet long, moving on centers in the frame *bbbb*; at the end of which, at *c 1*, *2*, *3*, *4*, are jointed four rods with their forcing plugs working into *d 1*, *2*, *3*, *4*, four cast iron cylinders four feet three quarters long, seven inches bore above, and nine below where the valves lie, fastened by screwed flanches over the four holes of a hollow trunk of cast iron, having four valves in it just over *eeee*, at the joining on at the bottom of the barrels, or cylinders, and at one end a sucking pipe or grate *f*, going into the water, which supplies all the four cylinders alternately.

From the lower part of the cylinders *d 1*, *d 2*, *d 3*, *d 4*, come out necks turning upward arch-wise, as *gggg*, whose upper parts are cast with flanches to screw up to the trunk *bbbb*; which necks have bores of seven inches diameter, and holes in the trunk above communicating

with them, at which joining are placed four valves. The trunk is cast with four bosses, or protuberances, standing out against the valves to give room for their opening and shutting; and on the upper side are four holes stopped with plugs, to take out on occasion, to clean the valves. One end of this trunk is stopped by a plug *i*. To the other iron pipes are joined, as *i 2*, by flanches, through which the water is forced up to any height or place required.

Besides these four forces, there are four more placed at the other ends of the librae, or levers (not shewn here to avoid confusion, but to be seen on the left hand) the rods being fixed at *a 1*, *2*, *3*, *4*, working in four cylinders, with their parts *dd*, &c. *ee*, *f*, *gg*, and *i*, as before described, standing near *kk*.

At the other end of the wheel (at *B*) is placed all the same sort of work as at the end *A* is described, *viz.*

The cog-wheel *I*.

The trundle *K*.

The spindle *X*.

The crank *Y*, *Z*.

The sucking pipes *f*.

The four levers *ac*, *ac*, &c.

Eight forcing rods, *ad*, *ad*, &c.

Eight cylinders, *de*, *de*, &c.

Four trunks, such as *ee*, *bb*.

Two forcing pipes, as *i*.

So that one single wheel works 16 pumps.

All which work could not be drawn in one perspective view, without making it very much confused.

A calculation of the quantity of water raised by the engines at London bridge.

In the first arch next the city is one wheel with double work of 16 forcers.

In the { First wheel double work at one end, and single at the other 12

third arch { Second wheel in the middle - - - - - 8

{ Third wheel - - - - - 16

In all 52 forcers.

One revolution of a wheel makes in every forcer - - - 2 strokes.

So that one turn of the four wheels makes - - - 114 strokes.

When the river is at best, the wheels go six times round in a minute, { 6

and but $4\frac{1}{2}$ at middle water - - - - -

The number of strokes in a minute - - - - - 684

The stroke is $2\frac{1}{2}$ feet in a 7 inch bore, raises - - - - - 3 ale gallons.

They raise per minute - - - - - 2052

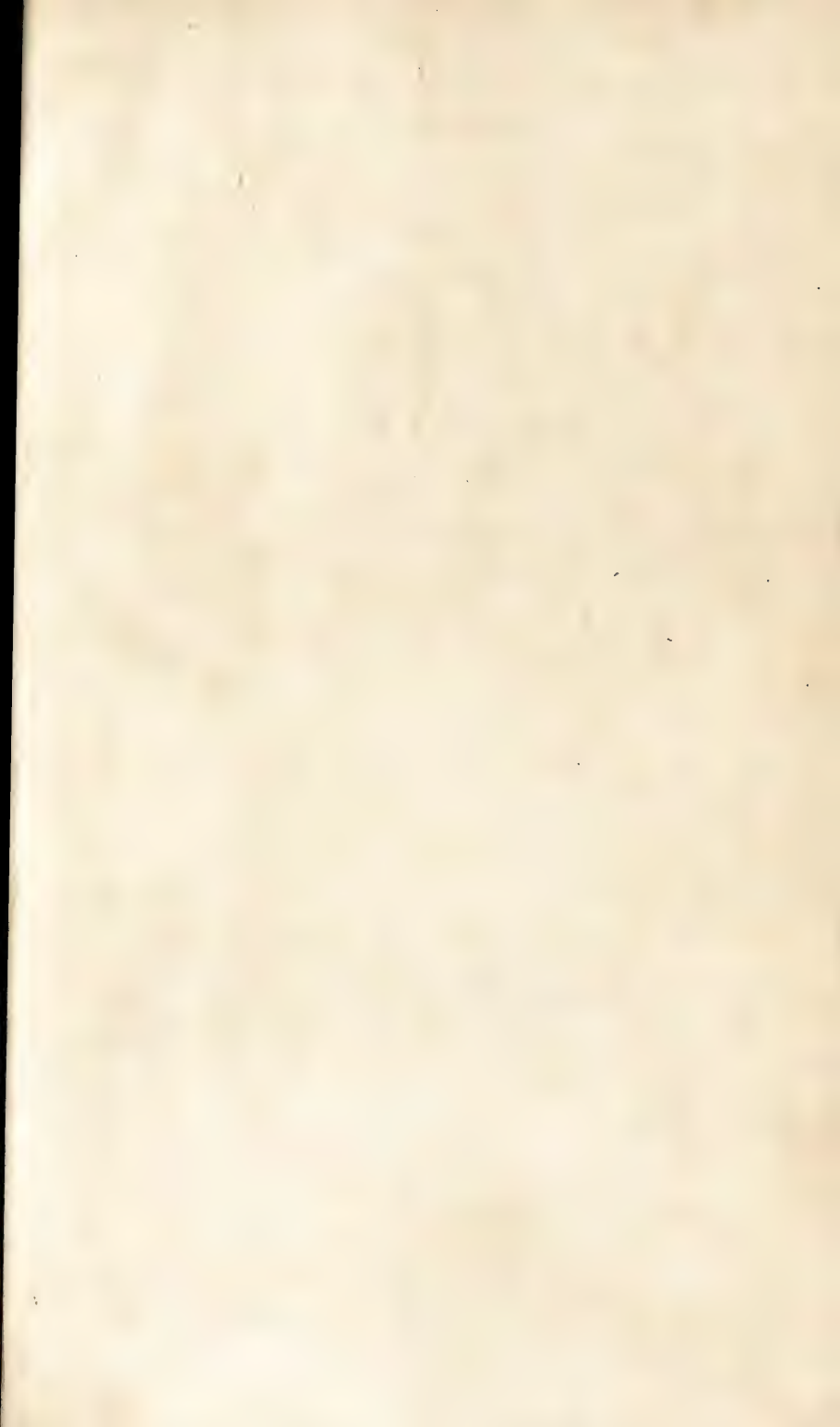
That is, 123120 gallons = 1954 hogheads per hour, and at the rate of 46896 hogheads in a day, to the height of 120 feet.

This is the utmost quantity they can raise, supposing there were no imperfections or loss at all.

But it is certain, from the considerations following, that no engine can raise so

much as will answer the quantity of water the cylinder contains in the length of the forces, or piston's motion. For, First, opening and shutting of the valves lose nearly so much of that column, as the height they rise and fall.

Secondly, no leather is strong enough for the piston, but there must continually slip, or squeeze by, some water, when it is raised



WATER-WORKS.

Fig. 1.

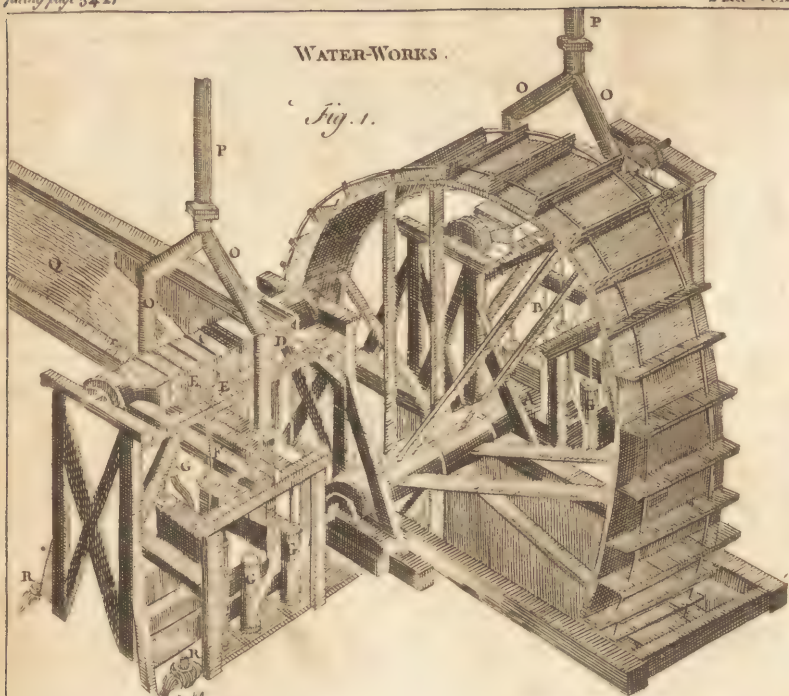


Fig. 2.

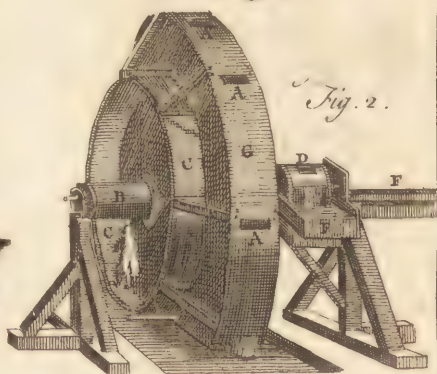


Fig. 3.

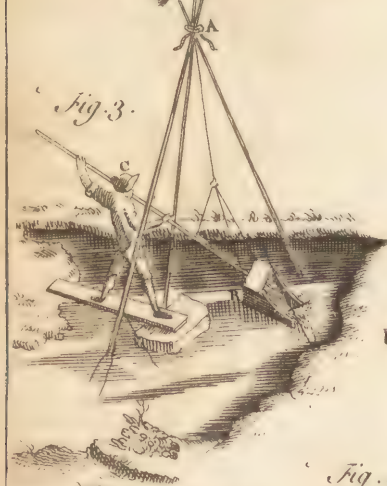
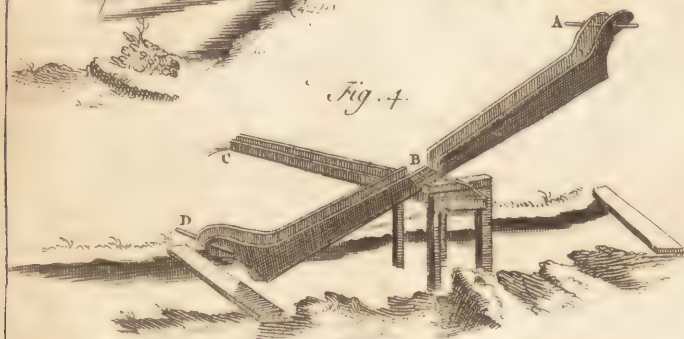


Fig. 7.



raised to a great height; and, when the column is short, it will not press the leather enough to the cylinder, or barrel: but, especially at the beginning or first moving of the piston, there is so little weight on it, that, before the leather can expand, there is some loss.

Thirdly, and this loss is more or less, as the pistons are looser or straiter leathered.

Fourthly, when the leathers grow too soft, they are not capable of sustaining the pillar to be raised.

Fifthly, if they are leathered very tight,

The power by which the wheels are moved.

The weight of the pillar of water on a forcer 7 inches diameter and 120 feet high,
 $7 \times 7 = 49$ lb. The pounds avoirdupoise in a yard, nearly.
 40 yards high.

1960 lb. on one forcer.

8 forcers always lifting.

The whole weight 15680 lb. = 140 Cwt. = 7 ton weight on the engine at once.
 Then the crank pulls the libra 3 feet from the forcer, and 8,3 feet from the center,
 7 ton

$\times 11.3$

8,3)79.1(9,5. ton on the crank.

Wallower - - - 2,2)9,5(4,3 ton on trundle.

The spur-wheel - - - 4

Radius of the great wheel 10)17,2(1,72 ton.

20

The force on the floats 18 Cwt. 40 lb. 34,40 Cwt.

But to allow for friction and velocity, may be reckoned 1 ton $\frac{1}{2}$.

The ladles, or paddles, 14 feet long, 18 inches deep, = 22,4 square feet.

The fall of water is at a mean - - - 2 feet.

44,8

6 gallons in a cubic foot.

268,8

10, lb. in a gallon.

112) 2688 (24 hundred.

The velocity of the water, 4 feet in 21''' of time.

21''' - 4 feet : : - 60'' : = 685 feet per minute.

The velocity of the wheel = 310 feet per minute.

Quantity expended on the wheel, according to the velocity of the stream, 1433 hogsheds per second.

But at the velocity of the wheel 64,5 hogsheds per second.

The velocity of the wheel to the velocity of the water, as 1 to 2, 2.

Fig. 1. plate CCXCIX. represents a curious machine for raising water, executed at Nynphenbourg, by the count de Whal, master of the works to the elector of Bavaria. It raises water sixty feet high into a reservoir, for the use of the elector's gardens.

The water of the canal, falling down the inclined plane at Q, turns the large wheel represented in the figure, the circumference of which, by cogs, moves the arbor D, and the same on the other

so as to lose no water, then a great part of the engine's force is destroyed by friction.

By some experiments accurately made on engines, whose parts are large and excellently performed, they will lose one fifth and sometimes one fourth of the calculated quantity.

However, the perfections or errors of engines are to be compared together, by the calculated quantities of forces; for as they differ in those, they will proportionably differ in their actual performances.

side; to those are fastened the pistons of sixteen forcing pumps G, four on each side the arbor, as represented in the figure.

From each of these pumps is a tube, through which the water is forced into the pipe O, and from thence through the pipe P, which conveys it into the reservoir. These pumps are fastened together by pieces of timber, with iron clamps, to make them firm, as may be seen in the figure.

This is a very good machine, and deserves to be imitated, either in whole or in part, when water is to be raised.

We shall conclude this account of water-works with a description of two machines much used in Holland.

Fig. 2. *ibid.* represents another machine for raising water: it is moved by the man C, walking in the wheel C, as is plain from the figure. The large wheel A, A, G, has seven square holes in its circumference, as A, A, A, which run in a spiral form to the axis B. The water, by the motion of the wheel whose circumference is constantly immersed in it, runs along these spiral tubes to the axis; from whence it is conveyed to D, where it is discharged, and by means of the trough and spout F, F, conveyed to the reservoir destined to receive it.

Fig. 3. *ibid.* represents a machine used by the Dutch for freeing their dykes of water. It consists of five pieces of board, forming a kind of scoop, as B; the handle C is suspended by a rope fastened to three poles placed triangularly, and fastened together at A, as is plain from the figure. As the working of this machine consists in balancing it, and directing it so that, after having filled it with water, it may throw it on the other side of the dam, we shall only observe that the labourer at two strokes can draw only half a cubic foot of water in four seconds, which amounts to four hundred cubic feet in an hour.

Fig. 4. *ibid.* is another machine of the same kind with that above described. The figure sufficiently explains its use. It is worked by two men, one at A, and another at D. The machine moves on the center B, and each end is immersed alternately in the water; by which means it flows into each end of the machine, where there is a valve, to prevent its returning; and, by the alternate motion of the machine, the water so taken up is conveyed to B, and from thence, by the spout C, over the dam.

WATERFORD, a port-town of Ireland, capital of the county of Waterford, situated on the river Sure, eight miles north of the sea: west longitude 7° , north latitude $52^{\circ} 12'$.

It is one of the largest cities in Ireland, and has a good foreign trade.

WATERING, in the manufactures, is to give a lustre to stuffs, &c. by wetting them lightly with gum-water, and then

passing them through the press, or calender, whether hot or cold.

The gum-water ought to be pure, thin, and clear, otherwise the folds of the stuff will stick together: the operation must also be performed when the water is very hot, that it may penetrate.

WATLINGTON, a market-town of Oxfordshire, situated twelve miles south-east of Oxford.

WATTON, a market-town of Norfolk, sixteen miles south-west of Norwich.

WAVE, *unda*, in philosophy, a cavity in the surface of water, or other fluid, with an elevation aside thereof. See **FLUID**. Sir Isaac Newton explains the nature of waves in water after the following manner: Let AB and CD (pl. CCXCVII. fig. 2. n^o 1.) be the surface of water quiescent in the upright leg KL, MN, of a received tube. And if the water be put into motion, and ascends in the leg KL to EF it will descend in the leg MN to GH; so that EA = DH. Again, let PV be a pendulum vibrating in the cycloid RPS, its length VP, from the point of suspension to the center of oscillation, is equal to half the length of the water in the tube; let P be the lowest point, and PQ an arch of the cycloid, equal to the altitude AE.

The force by which the water is alternately accelerated and retarded in its motion in the tube, is the excess of the weight of water in either leg above the weight in the other; and, therefore, when the water in the leg KL ascends to EF, and in the other leg descends to GH, that force is equal to the weight of the two equal quantities of water AEFB + CGHD = 2 AEFB; and, therefore, is to the weight of the whole water, as EA to VP, or as PQ to PR; because the semi-cycloid PR is equal to the length of the pendulum which describes it, from the nature of the curve.

All the power by which the weight P is in any point Q accelerated or retarded in the cycloid, is, to its whole weight, as the distance PQ from the lowest point P, to the length of the semi-cycloid PR. Wherefore, as the moving forces of the water and pendulum are at first quiescent, those powers will move them equally in equal times, and cause that they go forwards and backwards together with a reciprocal motion: all which is easily deduced from what has been said of the nature

ture of the cycloid, the motion of heavy bodies, and the forces of bodies in motion.

Hence it follows, that, whether the distance AE be great or small, the reciprocations of the water will all be performed in equal times. Also, it follows, that if the whole length of the water be 78,4 inches, each reciprocation, or ascent and descent of the water, will be performed in one second of time; because a pendulum of half that length vibrates in that time. Lastly, if the length of the aqueous canal be increased or diminished, the time of each reciprocation will be increased or diminished in the subduplicate ratio of the length.

When the nature of waves in water is considered, it will be found to agree very nearly with the motion of the water in the tube abovementioned; and, consequently, their motion will be similar to that of a pendulum. For let EFG (*ibid.* n^o 2.) represent the level surface of water when it is not agitated so as to produce waves; when it is thus agitated, let ABCD represent the wavy surface, AC the highest parts of the waves, and BD the lowest or concave part. Then it is evident, the weight of the water at A above EG will cause it to descend as far below the level to B; and with the motion acquired by that descent, it will again ascend to the same height C, and so produce a constant succession of waves in the watery surface, after the same manner as was shewn in the tube.

Hence it follows, that because the length of the whole water to be moved is from the highest point A to the lowest point B, if the length of a pendulum be half AB, it will oscillate once while the water descends from A to B; and in another oscillation, it will ascend from B to C; and so on. So that a wave will pass through its whole length in the time of two oscillations; and, therefore, in the time of one oscillation of a pendulum four times as long, or equal to ABC.

Whence, because ABC, in very large and wide waves, is nearly equal to the breadth AC; therefore, when the waves are 39,2 inches broad, they will undulate in one second of time; and, consequently, since the times of all the undulations are equal, there will be $39,2 \div 60 = 2352$ inches, or 196 feet, run through by a wave in one minute; which is 11760 feet per hour. Hence, also, the velocity of greater or lesser waves will be

increased or diminished in the subduplicate proportion of their breadth: that is, if $V =$ velocity of the greater waves ABCD, and $v =$ velocity of the lesser waves $a. b. c. d. e. f. \&c.$ then it will be $V : v :: \sqrt{AC} : \sqrt{ac}$. Because the velocities and times of bodies, moved in any manner by gravity, are proportional to the square roots of the perpendicular altitudes, and those altitudes are as the lengths of pendulums; and, therefore, as the breadth of waves.

The waves of the sea are of two kinds, natural and accidental. The natural waves are those which are exactly proportioned in size to the strength of the wind, whose blowing gives origin to them. The accidental waves are those occasioned by the wind's reacting upon itself by repercussion from hills and mountains, or high shores, and by the washing of the waves themselves, otherwise of the natural kind, against rocks and shoals: all these cases give the waves an elevation, which they can never have in their natural state.

Mr. Boyle has proved, by numerous experiments, that the most violent wind never penetrates deeper than six feet into the water; and it should seem a natural consequence of this, that the water moved by it can only be elevated to the same height of six feet from the level of the surface in a calm: and this six feet of elevation being added to the six of excavation, in the part whence that water so elevated was raised, should give twelve feet for the utmost elevation of a wave. This is a calculation that does great honour to its author; for count Marigli measured carefully the elevation of the waves near Provence, and found that, in a very violent tempest, they arose only to seven feet above the natural level of the sea, and this additional foot in height he easily resolved into the accidental shocks of the water against the bottom, which was, in the place he measured them in, not so deep as to be out of the way of affecting the waves; and he allows that the addition of one sixth of the height of a wave, from such a disturbance from the bottom, is a very moderate alteration from what would have been its height in a deep sea; and concludes, that Mr. Boyle's calculation holds perfectly right in deep seas, where the waves are purely natural, and have no accidental causes to render them larger than their just proportion. In deep water, under the high shores of the same

part of France, this author found the natural elevation of the waves to be only five feet; but he found also, that their breaking against rocks, and other accidents to which they were liable in this place, often raised them to eight feet high.

We are not to suppose, from this calculation, that no wave of the sea can rise more than six feet above its natural level in open and deep water; for waves immensely higher than these are formed, in violent tempests, in the great seas. These, however, are not to be accounted waves in their natural state, but they are single waves formed of many others; for in these wide plains of water, when one wave is raised by the wind, and would elevate itself up to the exact height of six feet, and no more, the motion of the water is so great, and the succession of the waves so quick, that, during the time this is rising, it receives into it several other waves, each of which would have been at the same height with itself; these run into the first wave, one after another, as it is rising: by this means its rise is continued much longer than it naturally would have been, and it becomes terribly great. A number of these complex waves arising together, and being continued in a long succession by the continuation of the storm, make the waves so dangerous to ships, which the sailors in their phrase call mountains high.

WAVE OFFERING, in Jewish antiquity, a sacrifice offered by agitation, or waving, towards the four cardinal points of the compass. See the article **SACRIFICE**.

WAVED, **WAVY**, or **WAVEY**, in heraldry, is said of a bordure, or any ordinary, or charge, in a coat of arms, having its out-lines indented, in manner of the rising and falling of waves: it is used to denote, that the first of the family in whose arms it stands, acquired its honours for sea-service.

WAVING, in the sea-language, is the making signs to a vessel to come near or keep off.

WAVREN, or **GAVEREN**. See the article **GAVEREN**.

WAX, or **Bees-wax**, in natural-history, a firm and solid substance, moderately heavy, and of a fine yellow colour, formed by the bees from the farina of flowers, which they work up and compress into a mass, or sort of cake, and of which they form their honey-combs;

from whence it is obtained by heating and straining them through a linen cloth, or by pressing them betwixt iron-plates, &c. The best sort is that of a lively yellow colour, and an agreeable smell, somewhat like that of honey: when new it is toughish, yet easy to break; but by age it becomes harder and more brittle, loses its fine colour, and in a great measure its smell. See the article **HONEY-COMB**.

From the common yellow wax, by the mere effect of sun and air, or by what is called bleaching, is formed what we term white-wax, and some, very improperly, virgin-wax. As the greater the surface is in proportion to the quantity, the sooner and more perfectly this operation is performed. The usual way is to melt the wax in hot water; when melted, they press it through a strainer of tolerable fine linen, and pour it into round and very shallow moulds. When hardened by cooling, it is taken out and exposed to the sun and air, sprinkling it now and then with water, and often turning it: by this means it soon becomes white. The best sort is of a clear and almost transparent whiteness, dry, hard, brittle, and of an agreeable smell, like that of the yellow wax, but much weaker.

The common yellow wax is of very great use both in medicine and in many of the arts and manufactures. It is sometimes given internally, as in dysenteries, and other erosions of the intestines; but its great use is in the making ointments and plasters for external use, and the greater part of those of the shops owe their consistence to it. The white wax is also an ingredient in some of the cerates and ointments of the shops; and is used in making candles, and in many of the nicer arts and manufactures, where wax is required.

Bees-wax, on being imported, pays a duty of 9s. 6⁰⁰/₁₀₀ d. the hundred weight, and draws back, on exportation, 8s. 7¹/₂ d.

Preparations of WAX. The butter and oil of wax are thus prepared: Cut the wax in pieces and put them into a retort, which must be half filled with these pieces; and the rest of the retort being filled with sand, it must be placed in a sand furnace. At first an acid spirit arises, and afterwards a thick oil, called the butter of wax, sticks in the neck of the retort, unless it be heated by applying a live coal. This may be rectified into

into a thin oil, by distilling it several times, without addition, in a sand-heat. The butter is an extremely soft and anodyne unguent; highly emollient and relaxing; agreeable to the nerves; and, when rubbed on contracted limbs, proves of great benefit to them. It is an excellent liniment for the piles, and takes off the pain attending them in a very sudden and surprizing manner. It also keeps the skin soft, and is one of the best things known to keep it from cracking or chapping in the winter.

The oil of wax, has also a very singular virtue in curing contracted tendons and restoring flexibility to the parts. It cures chapped nipples in women who give suck beyond any other application, and is as successful against chapped lips, and the cracking of the skin of the hands, only rubbing them once in three or four days with it. It is also of great use in discussing cold tumours arising on the face, and those on the fingers in winter.

Sealing-WAX is made in the following manner: Take one pound of bees-wax; three ounces of fine turpentine; olive-oil, and rosin, finely powdered, of each one ounce: when they are well melted, and the dross taken off, put in an ounce and a half of vermilion, or red-lead, finely ground, and stir them together till they are well incorporated: and when this mixture grows a little cool roll it into sticks, or in any other form. If you would have it black, instead of vermilion, or red-lead, put in lamp-black. The soft, red, and green wax, used in large seals to some of our law-writings, are thus made: Melt bees-wax over a gentle heat, with such a proportion of venice turpentine as, when cold, will give it the due consistence: this is determined by repeated trials, first putting in but little turpentine, and afterwards more and more, till by dropping a piece upon a marble to cool, it is found of the true consistence. They then colour it with red-lead, or vermilion, or with verditer, or whatever colours they please; the mixture in this state receiving any.

Grafting-WAX, a composition serving to bind the graft to the cleft of the stock. For the manner of making which, see *Methods of GRAFTING*.

To imitate fruit in WAX. Take the fruit and bury it half way in clay; oil its edges, and that part of the fruit which is uncovered; then nimbly throw on its tempered alabaster or plaster of Paris, to

a considerable thickness. When this is grown dry and hard, it makes the half mould; the second half of which may be obtained in the same manner. The two parts of the mould being joined together, a little bees-wax melted and brought to a due heat, being poured through a hole made in a convenient part of the mould, and presently shook therein, will represent the original fruit.

WAX-WORK, the representation of the faces, &c. of persons living or dead; made by applying plaster of Paris in a kind of paste, and thus forming a mould containing the exact representation of the features. Into this mould melted wax is poured, and thus a kind of masks are formed; which being painted and set with glass eyes, and the figures dressed in their proper habits, they bear such a resemblance that it is difficult to distinguish between the copy and the original.

WAXING, in chemistry, the preparation of any matter to render it fit and disposed to liquify, or melt, which of itself it was not.

This is frequently done to enable things to penetrate into metals and other solid bodies.

WAY, a passage or road. See *ROAD*. The roman ways are divided into consular, prætorian, military, and public; and of these we have four remarkable ones in England: the first, Watling-street, or Watheking-street, leading from Dover to London, Dunstable, Toucester, Atterston, and the Severn extending as far as Anglesea in Wales. The second, called Hikenild, or Ikenild-street, stretches from Southampton over the river Isis at Newbridge; thence by Camden and Lichfield; then passes the Derwent, near Derby, and ends at Tinmouth. The third, called Fosse-way, because in some places it was never perfected, but lies as a large ditch, leads from Cornwall through Devonshire, by Tethbury, near Stow in the Wolds; and beside Coventry to Leicester, Newark, and so to Lincoln. The fourth, called Erming, or Erminage-street, extends from St. David's, in Wales, to Southampton.

High WAY. See *HIGH-WAY*.

Milly-WAY. See the article *GALAXY*.

WAY of a ship, is sometimes the same as her rake, or run forward or backward; but this term is most commonly understood of her sailing. Thus when she goes a-pace, it is said that she hath a good way, or makes a fresh way. So when

when an account is kept how fast the sails by the log, it is called keeping an account of her way; and because most ships are apt to fall a little to leeward of their true course, they always in casting up the log-board, allow something for her leeward way.

WAY of the rounds, in fortification, is a space left for the passage of the rounds between the rampart and the wall of a fortified town. This is not now much in use; because the parapet, not being above a foot thick, is soon overthrown by the enemy's cannon.

WAY-WISER, an instrument otherwise called perambulator. See the article **PERAMBULATOR**.

WAY-WODE, a title given to the governors of the chief places in the empire of Muscovy, as also in Poland.

WEAR, or **WEER**, a great flank or dam in a river, fitted for the taking of fish, or for conveying the stream to a mill.

New wears are not to be made, or others altered, to the nulance of the public, under a certain penalty.

WEASEL, in zoology, a species of *Mustela*, with the tip of the tail black. See the article **MUSTELA**.

This is a smaller animal than the polecat: the head is small, of an ovated form, and sharp at the snout: the ears are small, short and patulous: the eyes of a fierce aspect: the mouth well furnished with teeth: the upper jaw longer than the under: the body is about eight inches long, and slender: the tail is a third part the length of the body: the legs are short and slender: the feet have five toes armed with sharp claws: the whole body is covered with a fine and tolerably long fur: the back is of a darkish colour, and the belly is white.

WEATHER, the state or disposition of the atmosphere with regard to heat, cold, wind, rain, frost, &c.

At it is in the atmosphere that all plants and animals live, and as that appears to be the great principle of most animal and vegetable productions, alterations, &c. there does not seem any thing, in all philosophy, of more immediate concernment to us than the state of the weather, and a knowledge of the great influence it has on our bodies. What vast, but regular, alterations a little turn of weather makes in a tube filled with mercury, or spirits of wine, or in a piece of string, &c. every body knows; in the common instance of barometers, thermo-

meters, &c. and it is owing partly to our inattention, and partly to our unequal and intemperate course of living, that we do not feel as great and regular ones in the tubes, chords, and fibres of our own bodies.

WEATHER-COCK, or **WEATHER-VANE**, a moveable vane in form of a cock, or other shape, placed on high, to be turned round according to the direction of the wind, and point out what quarter the wind blows from. See **WIND**.

WEATHER-GLASSES, are instruments contrived to indicate the state or disposition of the atmosphere, and the various alterations in the weather: such are barometers, thermometers, hygrometers, &c. See the articles **BAROMETER**, **THERMOMETER**, &c.

WEATHER-GAGE, in the sea-language. See the article **GAGE**.

WEATHERING, among sailors, signifies the doubling, or sailing by a headland, or other place.

WEAVING, the art of working a web of cloth, silk, or other stuff, in a loom with a shuttle. For the manner of performing which see the article **CLOTH**, &c.

WEAVING-LOOM, a machine for weaving cloth, silk, &c. by raising the threads of the warp in order to throw in the shoot, and strike it close. Of these there are various kinds, distinguished by the different sorts of cloths, stuffs, silks, &c. in which they are employed, and which are chiefly distinguished by the number and variety of the threads they raise in order to work the warp, either plain or in figures, by making more or less of the woof or shoot appear through the warp. In order to give a general idea of weaving, we shall here describe the parts of the common weaver's loom. See plate CCXCII. fig. 2. in which 9, 9, are the loom posts: 10. the cross-bars: 11. the batten; which serves to strike in, and close more or less the threads of the woof: 12. the cap of the batten, or a long bar, which the weaver takes hold of in one hand and then in the other: 13. the block, or under part of the same, containing the reed within the lower bar: 14. the cross-piece, or burdon and pin, which helps to make the batten moveable: 15. the gallows; a piece of wood suspending the pully, on which the cord moves that is tied to the two lams: 16. the breast-bar; a flat square piece of wood, with an opening in it to let the stuff through, which is rolled

rolled on the knee-roll : 17. the cane-roll, which the warp is turned on at the other end of the loom : 18. the reed : 20. pullies, upon which the cords roll that are fastened to the lams : 21. the tumbler ; which is a cord that passes from one lam to the other over the pully 20, and causes the working of the lams by its ascending and descending : 22. the muffle in which the pully acts : 23. a skain, or leish, cut into proper lengths, to mend the leishes of the harness that happen to break : 24. a bobbin of the warp, to mend the threads of the warp that occasionally break : 25. lizard thread, to mend those of the lizer that happen to break ; and which, especially in cloth, are very different from the warp : 26. the box to hold the quills : 28. the foot-bar : 29. the trundles, or moveable bars, tied with two cords to the lower virgee of each lam. When the foot presses a treadle, the lam that is fastened to it sinks, and the other rises by the help of the tumbler : 30. the foot-step : 31. the temple ; a double flat ruler, having small teeth at the extremities ; it may be lengthened or shortened by the help of a catch that is in one of the rulers, and introduced in a groove in the other ruler. The teeth in the extremities are fastened in the lizer of the work, by which means it is kept of an equal breadth ; and as the work advances the temple is moved forwards : 32. the shuttle seen in front and profile : 33. the knee-roll, on which the work is rolled as it is wove : 34. the tantow ; an iron lever to turn the knee-roll : 35. the reed seen separate.

WEB, a sort of tissue, or texture formed of threads interwoven with each other ; some whereof are extended in length, and called the warp ; and others drawn across, and called the woof. See the articles **CLOTH**, **WARP**, &c.

Spider's WEB, or **COBWEB**. See the article **COBWEB**.

WEDGE, *cuneus*, one of the mechanical powers, as they are called. See **POWER**. The wedge is a triangular prism, whose bases are equilateral acute-angled triangles. See the articles **PRISM**, &c.

The power of the wedge **ACBH** (plate **CCXCVII**, fig. 3.) is evident from its consisting of two equal inclined planes, **AHC** and **BHC** : but as it is chiefly used to separate the adhering parts of wood, the cohesion of which is every where variable and uncertain, there can

be no regular calculation of the actual effect of the wedge, in this case. But if we suppose the power of cohesion in the wood **ADEB** to be uniform, or to make every where an equal resistance to the wedge **ABC**, dividing its parts **AF** and **BG** ; then the power of the wedge would be to the resistance of the wood, as their velocities inversely, that is, as the spaces moved through in the same time, that is, as the height of the wedge **HC** to half its width **AH**.

WEDNESDAY, the fourth day of the week, so called from a saxon idol named Woden, supposed to be Mars, worshipped on this day.

Ash **WEDNESDAY**, the first day of Lent, so called from the custom observed in the ancient christian church of penitents expressing their humiliation at this time, by appearing in sack-cloth and ashes. The want of this discipline is at present supplied, by reading publicly on ash-wednesday the curses denounced in scripture against the several sorts of sins, the people repeating after each curse, Amen.

WEED, a common name for all rank and wild herbs, that grow of themselves, to the detriment of other useful herbs they grow among.

WEED, in the miners-language, denotes the degeneracy of a load or vein of fine metal into an useless marcasite.

WEEK, *septimana*, *hebdomada*, in chronology, a division of time comprising seven days.

The origin of this division of weeks, or of computing time by sevenths, is greatly controverted. Some will have it to take its rise from the four quarters or intervals of the moon, between her changes or phases, which, being about seven days distant, gave occasion to the division.

Be this as it will, the division is certainly very antient. The Syrians, Egyptians, and most of the oriental nations, appear to have used it from all antiquity : though it did not get footing in the west till Christianity brought it in : the Romans reckoned their days not by sevenths but by ninths, and the antient Greeks by decads or tenths.

Indeed, the Jews divided their time by weeks, but it was upon a different principle from the eastern nations. God himself appointing them to work six days, and to rest the sabbath, in order to keep up the sense and remembrance of the creation ; which being effected in six days, he rested the seventh.

Passion WEEK, or the *Holy WEEK*, is the last week in Lent, wherein the church celebrates the mystery of our Saviour's death and passion.

WEEK, or **WYCK**, in geography, a parliament and port-town of Scotland, in the shire of Cathness: west long. $2^{\circ} 45'$, north lat. $58^{\circ} 40'$.

WEEN, or **HUEN**, a little island in the sound, at the entrance into the Baltic, sixteen miles north of Copenhagen.

WEEVER, in ichthyology, the trachinus with the lower jaw longest, and without beards. See **TRACHINUS**.

It grows to six or eight inches in length, and is thick in proportion: the head is large and compressed, the eyes stand near one another at the top of it; the iris is of a gold yellow, the body is compressed, the lateral line straight; there is on each side at the opercula a large and robust spine; the tail is scarce at all forked; the first back fin has five prickly rays; the second has thirty-one; the pectoral fins have each sixteen rays, and the pinna ani has thirty-two.

WEIDEN, a town of Bavaria, situated on the river Nab, fifteen miles north of Amberg.

WEIGH, **WAY**, or **WEY**, *waga*, a weight of cheese, wool, &c. containing 256 pounds avoirdupoise. Of corn, the weigh contains forty bushels; of barley or malt, six quarters. In some places, as Essex, the weight of cheese is 300 pounds.

WEIGHER, an officer in divers cities appointed to weigh the commodities bought or sold in a public balance.

WEIGHING, the act of examining a body in the balance to find its weight.

WEIGHING-CHAIR, a machine contrived, by Sanctorius, to determine the quantity of food taken at a meal, and to warn the feeder when he had his quantum.

WEIGHING-ANCHOR, is the drawing it out of the ground it had been cast into, in order to set sail, or quit a port, road, or the like.

WEIGHT, **GRAVITY**, *pondus*, in physics, a quality in natural bodies whereby they tend downwards, towards the center of the earth. Or, weight may be defined, in a less limited manner, to be a power inherent in all bodies whereby they tend to some common point, called the center of

gravity; and that with a greater or less velocity, as they are more or less dense, or as the medium they pass thro' is more or less rare.

In the common use of language, weight and gravity are considered as one and the same thing. Some authors, however, make a difference between them; and hold gravity only to express a nifus or endeavour to descend, but weight an actual descent. But there is room for a better distinction. In effect, one may conceive gravity to be the quality as inherent in the body; and weight the same quality, exerting itself either against an obstacle, or otherwise. Hence, weight may be distinguished, like gravity, into absolute and specific. See **GRAVITY**.

Sir Isaac Newton demonstrates, that the weights of all bodies, at equal distances from the center of the earth, are proportionable to the quantities of matter each contains. Whence it follows, that the weights of bodies have not any dependence on their forms, or textures; and that all spaces are not equally full of matter. Hence, also, it follows, that the weight of the same body is different, on the surface of different parts of the earth; by reason its figure is not a sphere, but a spheroid. See the article **EARTH**.

WEIGHT, *pondus*, in mechanics, is any thing to be raised, sustained, or moved by a machine, or any thing that in any manner resists the motion to be produced.

WEIGHT, in commerce, denotes a body of a known weight, appointed to be put in the balance against other bodies, whose weight is required.

The security of commerce depending, in good measure, on the justness of weights, which are usually of lead, iron, or brass, most nations have taken care to prevent the falsification thereof, by stamping or marking them by proper officers, after being adjusted by some original standard. Thus, in England, the standard of weights is kept in the exchequer, by a particular officer called the clerk of the market. See the article **CLERK**.

Weights may be distinguished in to ancient and modern, foreign and domestic. **Antient WEIGHTS**, 1. Those of the antient Jews, reduced to the English troi weights, will stand as in the following table:

Shekel	-	-	-	-	-	lb.	oz.	dwt.	gr.
60	Maneh	-	-	-	-	00	00	09	02
3000	50 Talent	=	=	=	=	02	03	06	10
						113	10	01	10

WHEEL-CARRIAGES.

Fig. 1.

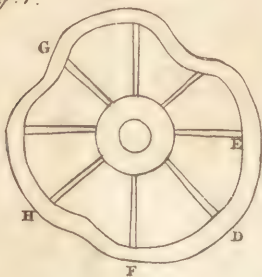


Fig. 6.

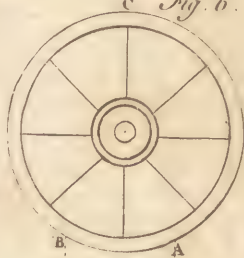


Fig. 2.

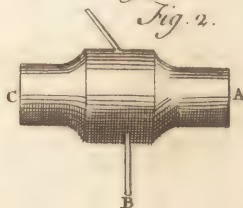


Fig. 3.

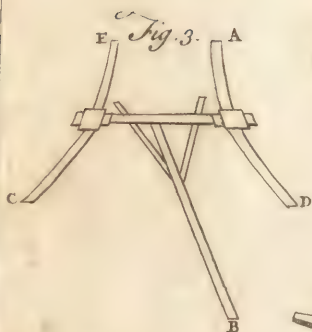


Fig. 7.

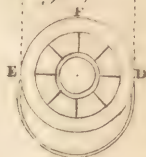


Fig. 8.

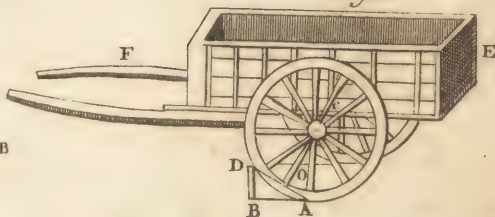


Fig. 4.

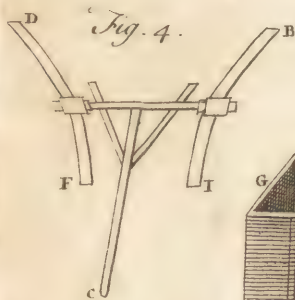


Fig. 9.

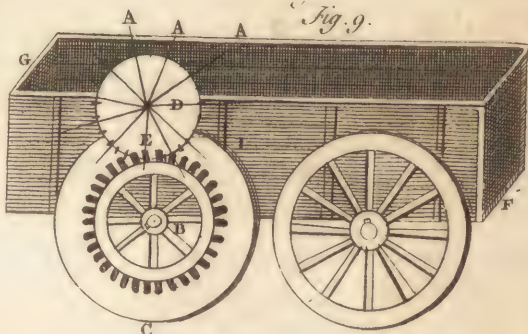


Fig. 5.

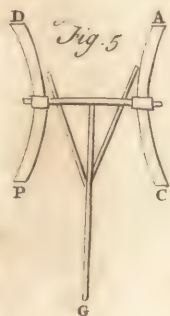
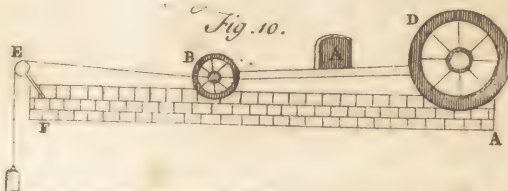


Fig. 10.





2. Grecian and Roman weights, reduced to english troy weight, will stand as in the following table :

										oz.	dwt.	gr.
Lentes										00	00	$\frac{85}{112}$
4	Siliquæ									00	00	$03\frac{1}{8}$
12	3	Obolus								00	00	$09\frac{3}{8}$
24	6	2	Scriptulum							00	00	$18\frac{3}{4}$
72	18	6	3	Drachma						00	00	$06\frac{1}{4}$
96	24	8	4	$1\frac{1}{2}$	Sextula					00	03	$00\frac{2}{7}$
144	36	12	6	2	$1\frac{1}{2}$	Sicilicus				00	04	$13\frac{2}{7}$
192	48	16	8	$2\frac{1}{2}$	2	$1\frac{1}{2}$	Duella			00	06	$01\frac{5}{7}$
576	144	48	24	8	6	4	3	Uncia		00	18	$05\frac{1}{7}$
6912	1728	576	288	96	72	48	36	12	Libra	10	18	$13\frac{5}{7}$

The roman ounces is the english avoirdupois ounce, which they divided into seven denarii, as well as eight drachms; and since they reckoned their denarius equal to the attic drachm, this will make the attic weights one eighth heavier than the corresponding roman weights.

Modern European WEIGHTS. 1. English weights : By the twenty-seventh chapter of Magna Charta, the weights all over England are to be the same; but for different commodities, there are two different sorts, *viz.* troy weight and avoirdupois weight. The origin from which they are both raised, is a grain of wheat gathered in the middle of the ear.

In troy weight, twenty-four of these grains make a penny-weight sterling; twenty penny-weights make one ounce; and twelve ounces one pound. See the article TROY.

By this weight we weigh gold, silver, jewels, grains, and liquors. The apothecaries also use the troy pound, ounce, and grain; but they differ from the rest in the intermediate divisions. They divide the ounce into eight drachms; the drachm into three scruples, and the scruple into twenty grains.

In avoirdupois weight, the pound contains sixteen ounces, but the ounce is less by near one-twelfth than the troy ounce; this latter containing 490 grains, and the former only 448. The ounce contains 16 drachms. 80 ounces avoirdupois are only equal to 73 ounces troy; and 17 pounds troy equal to 14 pounds avoirdupois. See AVOIRDUPOISE.

By avoirdupois weight are weighed mercury, and grocery wares, base metals, wool, tallow, hemp, drugs, bread, &c.

Table of Troy Weight as used by the Goldsmiths. Apothecaries;

Grains		
24	Penny-weight.	
480	20	Ounce.
5760	240	12 Pound.

Grains.		
20	Scruple.	
60	3	Drachm.
480	24	8 Ounce.
5760	288	96 12 Pound.

Table of Avoirdupois Weight.

Scruples.			
3	Drachm.		
24	8	Ounce.	
384	128	16	Pound.
43008	14336	1792	112 Quintal, or Hundred
860160	286720	35840	2240 20 Ton.

The moneyers, jewellers, &c. have a particular class of weights, for gold and precious stones, *viz.* carat and grain; and for silver, the penny-weight and

grain. See the article CARACT. The moneyers have also a peculiar subdivision of the grain troy: Thus,

The	{ Grain Mite Droit Perit }	into	{	20 Mites.
				24 Droits.
				20 Perits.
				24 Blanks.

The dealers in wool have likewise a particular set of weights, *viz.* the sack, weigh, tod, stone, and clove.

2. French weights: The common or Paris pound is 16 ounces; which they divide two ways: the first division is into 2 marcs; the marc into 8 ounces; the ounce into 8 gros; the gros into 3 penny-weights; the penny-weight into 24 grains; the grain equivalent to a grain of wheat. The second division of the pound is into 2 half-pounds; the half-pound into 2 quarters; the quarter into 2 half-quarters; the half-quarter into two ounces; and the ounce into two half-ounces.

The weights of the first division are used to weigh gold, silver, and the richer commodities; and the weights of the second division, for commodities of less value.

Grains.

24	Penny-weight.		
72	3	Gros.	
576	24	8	Ounce.
4608	192	64	8 Marc.
9216	384	128	16 2 Pound.

Half-ounce.

2	Ounce.		
4	2	Half-quarter pound.	
8	4	2	Quarter pound.
16	8	4	2 Half-pound.
32	16	8	4 2 Pound.
3200	1600	800	400 200 100 Quintal.

But the pound is not the same throughout France. At Lyons, *e. gr.* the city pound is only 14 ounces: So that 100 Lyons pounds make only 88 Paris pounds. But beside the city pound, they have another at Lyons for silk, containing 16 ounces. At Tholouse, and throughout the Upper-Languedoc, the pound is 13 ounces and a half of Paris weight. At Marfeilles, and throughout Provence, the pound is 13 ounces of Paris weight. At Rouen, beside the common Paris pound and marc, they have the weight of the vicomte; which is 16 ounces, a half, and five-sixths of the Paris weight. The weights, enumerated under the two articles of english and french weights, are the same that are used throughout the

greatest part of Europe; only under somewhat different names, divisions and proportions.

Particular nations have also certain weights peculiar to themselves: thus, Spain has its arrobas, containing 25 spanish pounds, or one-fourth of the common quintal: its quintal macho, containing 150 pounds, or one-half common quintal, or 6 arrobas: its adarme, containing one-sixteenth of its ounce. And for gold, it has its castellan, or one-hundredth of a pound. Its tomin, containing 12 grains, or one-eighth of a castellan. The same are in use in the Spanish West-Indies.

Portugal has its arroba, containing 32 Lisbon arratels, or pounds: Savary also mentions its faratelle, containing 2 Lisbon pounds: and its rottoli, containing about 12 pounds. And for gold, its chego, containing four carats. The same are used in the Portuguese East-Indies. Italy, and particularly Venice, have their migliaro, containing four mirres; the mirre containing 30 Venice pounds: The saggio, containing a sixth part of an ounce. Genoa has five kinds of weights, *viz.* large weights, whereby all merchandizes are weighed at the custom-house: cash weights for piastras and other species: the cantara, or quintal, for the coarsest commodities: the large balance for raw silks; and the small balance for the finer commodities. Sicily has its rotollo, 32 and a half pounds of Messina.

Germany, Flanders, Holland, the Hanse Towns, Sweden, Denmark, Poland, &c. have their schippont, which at Antwerp and Hamburg, is 300 pounds; at Lubbeck, 320; and at Coningsberg, 400 pounds. In Sweden, the schippont for copper is 320 pounds; and the schippont for provisions 400 pounds. At Riga and Revel, the schippont is 400 pounds at Dantzic, 340 pounds; in Norway, 300 pounds; at Amsterdam, 300; containing 20 lysponds, each weighing 15 pounds. In Muscovy, they weigh their large commodities by the bercheroft, or berkewit containing 400 of their pounds. They have also the poet, or poede, containing 4 pounds, or one-tenth of the bercheroft. In order to shew the proportion of the several weights used throughout Europe we shall add a reduction of them to our standard, *viz.* the London and Amsterdam-pound.

1. Proportion of the weights of the principal places of Europe.

The 100 lb. of England, Scotland, and Ireland are equal to

lb	oz.
91	8 of Amsterdam, Paris, &c.
96	8 of Antwerp or Brabant.
88	0 of Rouen, the viscounty weight.
106	0 of Lyons, the city weight.
90	9 of Rochelle.
107	11 of Toulouse and Upper Languedoc.
113	0 of Marseilles or Provence,
81	7 of Geneva.
93	5 of Hamburg.
89	7 of Francfort, &c.
96	1 of Leipzig, &c.
137	4 of Genoa.
132	11 of Leghorn.
153	11 of Milan.
152	0 of Venice.
154	10 of Naples.
97	0 of Seville, Cadiz, &c.
104	13 of Portugal.
96	5 of Leige.
112	$\frac{3}{4}$ of Russia.
107	$\frac{1}{2}$ of Sweden.
89	$\frac{1}{2}$ of Denmark.

2. Proportion of the weights of the chief Cities in Europe, to those of Amsterdam.

An 100 pounds of Amsterdam are equal to

lb	
108	of Alicant.
105	of Antwerp.
120	of Archangel, or 3 poedes.
105	of Arschot.
120	of Avignon.
98	of Basil in Switzerland.
100	of Bayonne in France.
166	of Bergamo.
97	of Bergen-op-zom.
95	$\frac{1}{4}$ of Bergen in Norway.
111	of Bern.
100	of Basançon.
100	of Binboa.
105	of Bois le duc.
151	of Bologna.
100	of Bourdeaux.
104	of Bourgen Bresse.
103	of Bremen.
125	of Breslaw.
105	of Bruges.
105	of Brussels.
105	of Cadiz.
105	of Cologne.
125	of Coningberg.
107	$\frac{1}{2}$ of Copenhagen.
87	rottos of Constantinople.
113	$\frac{1}{2}$ of Dantzic.
100	of Dort.
97	of Dublin.
97	of Edinburgh;

lb	
143	of Florence.
98	of Francfort on the Maine.
105	of Gaunt.
89	of Geneva.
163	of Genoa, cash weight.
102	of Hamburg.
106	of Leyden.
105	of Leipzig.
105	$\frac{1}{2}$ of Liege.
114	of Lisle.
143	of Leghorn.
106	$\frac{1}{2}$ of Lisbon.
109	of London, avordupoise weight.
105	of Lovaine.
105	of Lubec.
141	$\frac{1}{2}$ of Lucca, light weight.
116	of Lyons, city weight.
114	of Madrid.
105	of Marlines.
123	$\frac{1}{2}$ of Marseilles.
154	of Messina, light weight.
168	of Milan.
120	of Montpelier.
125	bercherocets of Muscovy.
100	of Nantes.
106	of Nancy.
169	of Naples.
98	of Nuremberg.
100	of Paris.
112	$\frac{1}{2}$ of Revel.
109	of Riga.
100	of Rochelle.
146	of Rome.
100	of Rotterdam.
96	of Rouen, viscounty weight.
100	of St. Malo.
100	of St. Sebastian.
158	$\frac{1}{2}$ of Saragosa.
106	of Seville.
114	of Smyrna.
110	of Stetin.
81	of Tholouse and Upper Languedoc.
151	of Turin.
158	$\frac{1}{2}$ of Valencia.
182	of Venice, small weight.

WEIGHTS, used in the several parts of Asia, the East-Indies, China, Persia, &c. In Turkey, at Smyrna, &c. they use the batman, or battemant, containing six occos; theocco weighing three pounds four-fifths English. They have another batman much less, consisting as the former, of six occos; but theocco only containing fifteen ounces english: 44 occos of the first kind make the turkish quintal. At Cairo, Alexandretta, Aleppo, and Alexandria, they use the rotto, roiton, or rottoli. The rottoli at Cairo, and other

parts of Egypt, is 144 drachms; being somewhat over an english pound. At Aleppo there are three sorts of rottos; the first 720 drachms, making about seven pounds english, and serving to weigh cottons, galls, and other large commodities: the second is 624 drachms, used for all silks but white ones, which are weighed by the third rotto of 700 drachms. At Seyda the rotto is 600 drachms.

The other ports of the Levant, not named here, use some of these weights; particularly theocco, or occua, the rottoli, and rotto.

The chinese weights are the piece, for large commodities; it is divided into 100 catis, or cattis; tho' some say into 125; the cati into 16 taels, or tales; each tael equivalent to $1\frac{1}{2}$ of an ounce english, or the weight of one rial and $\frac{1}{12}$, and containing twelve mas, or masses, and each mas 10 condrens. So that the Chinese piece amounts to 137 pounds english avoirdupois, and the cati to 1 pound 8 ounces. The picol for silk containing 66 catis and $\frac{3}{4}$, the bahar, bakaire, or barr, containing 300 catis.

Tonquin has also the same weights, measures, &c. as China. Japan has only one weight, viz. the cati; which, however, is different from that of China, as containing 20 taels. At Surat, Agra, and throughout the states of the great mogul, they use the man, or maund, whereof they have two kinds; the king's man, or king's weight; and the man simply; the first used for the weighing of common provisions, containing 40 seers, or ferres; and each seer a just Paris pound. The common man, used in the weighing of merchandize, consists likewise of 40 seers, but each seer is only estimated at 12 Paris ounces, or $\frac{2}{3}$ of the other seer.

The man may be looked on as the common weight of the East-Indies, though under some difference of name, or rather of pronunciation; it being called mao at Cambaya, and in other places mein, and maun. The seer is properly the indian pound, and of universal use; the like may be said of the bahar, tael, and cati above-mentioned.

The weights of Siam, are the piece containing two shans, or cattis; but the Siamese cati is only half the Japonese, the latter containing 20 taels, and the former only 10; though some make the Chinese cati only 16 taels, and the Siamese 8. The tael contains 4 baats or ti-

calis; each about a Paris ounce; the baat 4 selings, or mayons; the mayon 2 fouango; the fouang 4 payes; the paye 2 clams; the sompaye half a fouang.

It is to be observed, that those are the names of their coins as well as weights; silver and gold being commodities there sold, as other things, by their weights.

In the isle of Java, and particularly at Bantam, they use the gantan, which amounts to near three dutch pounds. In Golconda, at Visapour, and Goa, they have the furatelle containing 1 pound 14 ounces english; the mangalis or mangelin for weighing diamonds and precious stones, weighing at Goa 5 grains, at Golconda, &c. $5\frac{1}{2}$ grains. They have also the rotolo containing $14\frac{1}{2}$ ounces English; the metrical containing the sixth part of an ounce; the wall for plaisters and ducats, containing the $73d$ part of a rial.

In Persia they use two kinds of batmans or mans, the one called cabi or cheray, which is the king's weight; and the other batman of Tauris. The first weighs 13 pounds 10 ounces english; the second, 6 pounds $\frac{1}{2}$. Its divisions are the ratel, or a 16th; the derhem or drachm, which is the 50th; the meschal, which is half the derhem; the dung, which is the 6th part of the meschal, being equivalent to six carat-grains; and, lastly, the grain which is the fourth part of the dung. They have also the vakie, which exceeds a little our ounce; the sah-cheray, equal to the 1170th part of the derhem; and the toman used to weigh our large payments of money, without telling; its weight is that of 50 abassis.

African and American weights. We have little to say as to the weights of America; the several european colonies there making use of the weights of the states or kingdoms of Europe they belong to. For, as to the aroue of Peru, which weighs 27 pounds, it is evidently no other than the spanish arroba with a little difference in the name.

As to the weights of Africa, there are few places that have any, except Egypt, and the countries bordering on the Mediterranean; whose weights have been already enumerated among those of the ports of the Levant. The island of Madagascar indeed has weights, but none that exceed the drachm, nor are they used for any thing but gold and silver.

WEIGHT of the air. See AIR.

WELL, or WEXL, an imperial city of Ger.

Germany, in the circle of Swabia, and dutchy of Wirtemberg: east long $8^{\circ} 40'$, north lat. $48^{\circ} 40'$.

WEILBURG, a town of Germany, in the territory of Weteravia, and county of Nassa, 26 miles north of Francfort.

WEIMAR, a city of Germany, in the circle of Upper Saxony, the capital of the dutchy of Weimar: east long. $11^{\circ} 25'$, north lat. 51° .

WEINGARTEN, a town of Germany, in the palatinate of the Rhine, twenty-five miles south-west of Heidelberg.

WEINHEIM, a town of Germany, in the palatinate of the Rhine, ten miles north of Heidelberg.

WEISCHELMUNDE, or **MUNDE**, a fort of polish Prussia, at the mouth of the Vistula, which defends the harbour of Dantzick.

WEISEL, a river of Poland, and the same with the Vistula. See **VISTULA**.

WEISSENBURG, or **CROWNWEISSENBURG**, a town of Germany, in the circle of the Upper Rhine, and Landgravate of Alsace, twenty miles south west of Philipsburg.

WEISSENBURG, or **STULWEISSENBURG**, a city of Lower Hungary, situated near the east end of the Platten sea, thirty-six miles south-west of Buda.

WEISSENBURG, a town of Transilvania, thirty miles west of Hermanstat.

WEISSENBURG, a town of Germany, in the circle of Franconia, twenty miles north-west of Ingolstat.

WEISSENFELD, a town of Germany, in the circle of Upper Saxony, and marquisate of Misnia, seventeen miles south-west of Leipzick.

WELCHPOLE, a market-town of Montgomeryshire, situated six miles north of Montgomery.

WELD, or **WOLD**, *leuteola*, in botany, the same with the reseda of Linnæus. See the article **RESEDA**.

WELDING HEAT, in smithery, a degree of heat given to iron, &c. sufficient only for bending, or doubling it up. See the articles **FORGING** and **HEAT**.

WELL, a hole under ground, usually of a cylindrical figure, and walled with stone and mortar: its use is to collect the water of the strata around it.

WELL, in the military art, a depth which the miner sinks under ground, with branches or galleries running out from it; either to prepare a mine, or to discover and disappoint the enemy's mine.

WELL-HOLE, in building, is the hole left in a floor for the stairs to come up

through. See the article **STAIRS**.

WELLS, a city of Somersetshire, situated sixteen miles south-west of the city of Bath, both which cities have but one bishop.

This is also the name of a town of Germany, in the circle of Austria, situated eleven miles south of Linz.

WELLAND, a river which rising in Leicestershire, and running eastward between the counties of Rutland and Northampton, and afterwards north-east by Stamford, falls into a bay of the German Sea, which divides the counties of Lincoln and Norfolk.

WELLINGBOROUGH, a market-town of Northamptonshire, situated on the river Nen, ten miles north-east of Northampton.

WELLINGTON, a market-town of Shropshire, situated ten miles east of Shrewsbury.

WEM, a market-town of Shropshire, situated eight miles north of Shrewsbury.

WEN, a tumour or excrescence that arises on different parts of the body, and contains a cystus, or bag filled with some peculiar matter, of which physicians reckon three kinds, *viz.* when this matter is soft, resembling pulp, the wen is called atheroma; if like honey, meliceris; and if like suet, steatoma. See the articles **TUMOUR**, **ATHEROMA**, &c.

WENDOVER, a borough-town of Bucks, six miles south of Aylesbury; which sends two members to parliament.

WENER, a lake in Sweden, in the province of Gothland, seventy miles in length, and fifty in breadth.

WENLOCK, a borough-town of Shropshire, ten miles south-east of Shrewsbury; which sends two members to parliament.

WENSUSSEL, the north division of Jutland, in Denmark, having the Categate-Sea on the north; the Schaggerrack sea, on the east; the province of Wiburg on the south; and the German Sea on the west.

WEOBLEY, a borough-town of Herefordshire; 12 miles north-west of Hereford; which sends two members to parliament.

WERCHTEREN, a town of the austrian Netherlands, in the province of Brabant, nine miles east of Mechlin.

WERDEN, a town of Germany in the circle of Westphalia, ten miles north-east of Dusseldorp.

WERE, in our old law-books, denotes a sum paid for killing a person, when such crimes were punished with pecuniary mulcts, and not death.

WERE-

WERELADA, among our saxon ancestors, the denying an homicide, on oath, in order to be quit of the fine called **WERE**.

WERGILD, or **WEREGELD**, in our ancient customs, the price of a man's head, a part of which was paid to the king, for the loss of his subject, a part to the lord whose vassal he was, and a part to the nearest relation of the person slain.

WERMELAND, a province of Sweden, lying between the province of Dalecarlia, on the north, and the lake Wener on the south.

WESEL, a city of Germany, in the dutchy of Cleves: east long. $6^{\circ} 5'$, north lat. $51^{\circ} 37'$.

WEISEL, a river of Poland, also called the Vistula. See the article **VISTULA**.

WESER, a river of Germany, which rises in the Landgrate of Hesse, runs between the circles of Westphalia and Lower Saxony, and falls into the German Sea below Carlsstat.

WEST, in cosmography, one of the cardinal points of the horizon, diametrically opposite to the east; and strictly defined, the intersection of the prime vertical with the horizon, on that side the sun sets in. See **HORIZON**, &c.

In astronomy, west is chiefly used for the place in, or towards which, the sun or stars sink under the horizon. Thus we say, the sun, mars, &c. are in the west. The point the sun sets in, when in the equator, is particularly called, the equinoctial west, or point of true west. See the article **EQUINOCTIAL**.

In geography, west and western, are applied to several countries, &c. situate towards the point of sun-setting, with respect to certain others. Thus the roman empire was antiently, and the german empire is at present, called the empire of the west, or the western empire, in opposition to that of Constantinople, which is called the eastern empire. The roman church is called the western church, in opposition to the greek church. The Italians, French, Spaniards, &c. are called western nations, in respect to the Asia-tics; and part of America, the West-Indies, in respect to the East-Indies.

WESTBURY, a borough-town of Wiltshire, twenty miles north-west of Salisbury; which sends two members to parliament.

WESTERN ISLES. See the articles **AZORES** and **HEBRIDES**.

WESTLOW, a borough-town of Corn-

wal, twenty-three miles south-west of Launceston; which sends two members to parliament.

WESTMANIA, a province of Sweden, having Upland on the east, and Wermeland on the west.

WESTMEATH, a county of Ireland, in the province of Leinster, bounded by Longford and Cavan on the north; by Eastmeath, on the east; by King's County, on the south; and by the river Shannon, which divides it from Roscommon, on the west.

WESTMINSTER, a city which forms the west part of the town which goes by the general name of London; but is under a distinct government; the dean and chapter appointing the high steward, high bailiff, and other officers, who have the government of the city. Here are the king's palaces, and the houses of most of the nobility, the high court of parliament, and the supreme courts of justice; but there is no bishop of this city. It elects two members of parliament. See the article **LONDON**.

WESTMORELAND, an english county bounded by Cumberland, on the north; by Yorkshire on the east; by Lancashire, on the south; and by the Irish channel on the west.

WESTPHALIA, the north-west circle of the empire of Germany, bounded by the german ocean, on the north; by the circle of Lower Saxony, on the east; by the Landgrate of Hesse, the Palatinate of the Rhine, and the electorate of Trriers, on the south; and by the Netherlands on the west; being 200 miles in length, and from 150 to 200 in breadth.

WESTRAM, a market-town of Kent, under the meridian of London, 44 miles west of Canterbury.

WETER, a swedish Lake, in the province of Gothland, ninety miles long.

WETTERAVIA, or **WETTERAW**, the southern division of the Landgrate of Hesse, in Germany, lying along the northern bank of the river Maine, comprehending the counties of Hanau and Nassau.

WETZLAR, an imperial city of Germany, in the circle of the Upper Rhine and territory of Wetteravia, situated on the river Lohn, east long. $8^{\circ} 15'$, north lat. $50^{\circ} 30'$.

WEXFORD, a county of Ireland, in the province of Munster, bounded by the county of Wicklow, on the north; by the ocean on the east and south; and by Kilkenny and Waterford on the west.

Wexford,

Wexford, the capital of this county, is situated at the mouth of the river Slaney, sixty-five miles south of Dublin.

WEYMOUTH, a port-town of Dorsetshire, situated on a fine bay of the english channel, seven miles south of Dorchester. It sends two members to parliament.

WHALE, *balæna*, in ichthyology. See the article BALÆNA.

The *balæna*, with the fistula, in the middle of the head, and the back ridged toward the tail, is the fish determinately and properly called the whale, though the physeter, as well that with the upper jaw longest, and with a long spine on the back, as that with the back-fin very tall, and the summit of the teeth plane, is the former called the crooked toothed whale, and the latter the plane toothed whale; as is also that physeter which is a species of the *balæna*. See PHYSETER.

The *balæna*, or the whale properly so called, grows to a monstrous size; the head is extremely large, and of an irregular figure, the lower jaw is much larger than the upper, and covers it at the sides; the upper, is narrow and oblong, the fistula is double, or has two distinct apertures, and is situated in the middle of the head, between the eyes; the eyes are very small in proportion to the enormous bulk of the head, and are placed a great distance from one another; the whole head is somewhat depressed, and has several irregularities on its surface; the body is very thick, and somewhat rounded, but towards the extremity of the back, there is a subacute angle, extending itself longitudinally to the tail; the tail is somewhat forked, very large, and in its horizontal situation makes a very singular figure. This is an inhabitant of the most northern seas, the principal object of the Greenland fishery, and the first known species.

For the manner of fishing for the whale, see the article FISHERY.

WHALE-BONE, or as it is otherwise called, whale-fins, in commerce, a commodity procured from the whale, used as stiffening in stays, fans, busks, skreens, &c. What we call whale-bone, or fins, is a horny laminæ in the upper jaw of the *balæna*, which supply the place of teeth, but there are none such in the lower jaw. These laminæ are commonly called whiskers, which, split and fashioned, are the whale-bone. The pizzle, or genital member of the animal serves likewise for the same

purpose. Whale-bone cut, is prohibited to be imported.

Whale-fins of Newfoundland, or any of the british-colonies, or plantations, caught and imported in ships belonging to Great Britain, pay the pound, on im-

portation, $2\frac{81\frac{1}{2}}{100}$ d. and draw back, on ex-

portation, $2\frac{81\frac{1}{2}}{100}$ d. Whale-fins of any of

the british-colonies, caught in ships belonging to those parts, but imported in ships belonging to Great Britain, pay the ton on importation, 28 l. 13 s. 9 d. and on exportation, draw back 28 l. 1 s. 10 $\frac{5}{8}$ d. Whale-fins of any of the british-colonies, caught and imported in ships belonging to those parts, pay the ton, on importation, 31 l. 2 s. 6 d. and on exportation, draw back 29 l. 18 s. 9 d. Whale-fins of foreign fishing, the ton, pay on importation, 97 l. 2 s. and on exportation, draw back 88 l. 11 s. For the whale-fins, train-oil, and blubber of whales caught in the Greenland-seas, or St. David's Straights, or any parts of the seas adjoining, &c. See OIL.

WHARF, a space on the banks of a haven, creek, or hithe, provided for the convenient loading and unloading of vessels upon. See HAVEN, HITHE, &c.

The fee paid for the landing of goods on a wharf, or for shipping them off, is called wharfage, and the person who has the direction and oversight of the wharf, receives wharfage, &c. is called the wharfinger. See the article KEY.

WHEAT, *triticum*, in botany. See the article TRITICUM.

It has been very justly observed by the antients, as well as moderns, that wheat will grow in almost any part of the world, and that, as it is the plant most necessary to mankind, so it is the most general and the most fruitful. It grows well not only in the temperate climates, but in the very hot and very cold ones; and when sown in places where it never grew spontaneously, succeeds as well as where it has been always common.

Mr. Tull observes, that when wheat is planted early, less seed is required to an acre than when it is planted late, because less of it will die; and poor land should always be allowed more seed than rich, because a greater number of the plants will perish on this land than on the other. The least quantity yet of seed

is necessary for rich land, that is planted early: for in this case very few of the seeds will fail to produce a plant that will live and flourish. The use of the hoe causes every plant to send out a great number of stalks from the same root; and in these, more than in the number of plants, consists the richness of a crop, as the ears on these are always largest and fullest. See HOING and HUSBANDRY. Another thing to be considered, in order to find the proper quantity of seed to plant, is, that some wheat of the same species has its grains twice as large as others: in this case, a bushel containing but half the number of grains that it does in the small grained-wheat, one bushel of the small-grained will plant just as much as two bushels of this; not the measure of the seeds, but the number of the grains being the thing to be considered in regard to the sowing.

It is a very natural thing to suppose that a large-grained wheat will produce larger and finer plants, and larger grain than a small-grained one; but experiments have proved, that there is nothing in this; for the smallest-grained wheat produces fully as large plants as the largest, and those with as great ears, and as big seeds; but the young plants appear smaller and poorer. Six gallons of middle-sized seed is the usual quantity drilled upon an acre; but on rich lands, planted early, four gallons will suffice; because then the wheat will have roots at the top of the ground before winter, and tiller very much, without danger of the worms, and many other accidents, which the late planted wheat is liable to. If it be drilled too thin, it will be in danger of falling, and if too thick, it may happen to tiller so late in the spring, that some of the ears may be blighted; a medium therefore is best. See the article DRILLING.

The depth to plant it at, is from half an inch to three inches; for if planted too deep, there is more danger of its being eaten off by worms between the grain and the blade. A wheat-plant that was not sown early, sends out no root above the grain, before the spring, and is nourished all the winter by a single thread, proceeding from the grain up to the surface of the ground: this is the thread of life to the plant during the winter, and the longer that is, the greater danger there is of the worm, that creature

much more easily finding a thread that extends by its length to five or six inches deep, than one which reaches but one inch; beside, the worms in winter do not inhabit very near the surface of the ground, and therefore they never naturally come in the way of the short threads, though the long ones are always in their reach.

It is very necessary to take care against the rooks, just at the time when the wheat is shooting up. These mischievous birds perceiving it beginning to sprout, before the farmer can see any thing of it, and are led by the shoot to pick it up; they must be carefully kept off the ground for a week or ten days at this season; for at the end of that time the blade will be grown up, and the grain so exhausted of its flour, that it will be of no value to them, nor will they give themselves any trouble about stealing it.

There are four ways of augmenting the crops of wheat not only in the number of the plants, but in the stalks, ears, and grains. The first is by increasing the number of stalks from one, two or three, to thirty or forty in each plant, in ordinary field land; and the crop is augmented by bringing up all these stalks into ear, which is the second way; for if it be diligently observed, it will be found that not one half of the stalks of wheat, sown in the common way, ever come to ear at all: nay, if a square yard of sown-wheat be marked out, and the stalks thereon numbered in the spring, it will be found that no less than nine parts in ten of them are wanting at the harvest-time.

An experiment of the advantage of this augmentation was made by Mr. Tull in rows of wheat that were equally poor; one of these rows was increased so much, as to produce more grains than ten of the other, by bringing up more of its stalks into ears; and also by augmenting the ears to a much greater bigness, which is the third way: for it is very certain that the ears will be much larger or much smaller, according to the quantity of nourishment that is given them.

The fourth and last way of increasing the crops of wheat is by causing the grain to be much larger in the ears. This can no way be done so effectually as by late hoeing, especially if it be done just after the wheat is gone out of the blossom; by this means the grains will weigh twice as much as those produced in the same

same sort of wheat, when this late hoeing has been omitted; their number, at the same time, is the same in the ear; and as the wheat is sold not by tale, but by measure, the farmer's gain is double in this case; the wheat measuring just twice as much as it would otherwise have done.

Thus, by increasing the number of the stalks, bringing more of them up into the ear, making the ears larger, and the grains larger, plumper, and fuller in every ear; the method of horse-hoeing, by which alone this can be effected, makes a larger crop out of the tenth part of the number of plants, than in the common way: but all these advantages will be lost by those who, though they give into the horse-hoeing-way, yet will not allow the six feet intervals between the rows; for it is owing to this great space of ground alone, that as much nourishment may be given to the wheat as the farmer pleases.

Poor light land, in the common way of husbandry, must be extremely well manured, in order to the maintaining wheat a year, which is the usual time that it is in it; and if it be sown late, the greater part of it usually perishes, not being able to survive the winter while so poor, and on such land; and if it be sown very early on strong land, though rich, well tilled, and dunged, the crop will be worse than on poor light land sown early. The new method of horse-hoeing gives both to strong and to light land all the advantages necessary, and takes off all the disadvantages of both. By this method the strong land may be planted with wheat as early as the light, if plowed dry; and the hoe-plough, if rightly applied, will be able to give it nourishment equal to that of dung in both sorts of land.

The tops of the ridges for the drilling of wheat must not be left quite so narrow and sharp as they are for drilling of turneps; wheat being generally to be sowed in treble rows, and the turnep only in single ones. In reaping the wheat thus sown, it is to be cut as near to the ground as possible, and this is easier done in this than in wheat sown in the common way, because in this drilled method the stalks all stand close together. When the wheat is cut thus low in the reaping, the stubble is no great impediment to the preparing the land for the succeeding crops.

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As soon as conveniently may be, after the carrying off a crop of wheat, if the trench in the middle of each wide interval be left deep enough by the last hoeing, the farmer is to go as near as he can to the stubble with a common plough, and turn two large furrows into the middle of the intervals which will make a ridge over the place where the trench was; but if the trench be not deep enough, it is best to go first in the middle of it with one furrow; this, with two more taken from the ridges, will be three furrows, in each interval; this plowing is to be continued as long as the dry weather lasts, and then the whole is to be finished by turning the partitions on which the last wheat grew up to the new ridges, which is usually done at two great furrows; these last furrows, which complete the ridges, may be plowed in wet weather. By this sort of management, the wheat being planted in rows, at six feet intervals, the same piece of ground will produce every year a new crop of wheat in the intervals, without any fallowing or manure, only by means of the sufficiently breaking the surface with plowing and horse-hoeing.

Buck WHEAT. This is a plant very advantageous to the farmers of England, who have barren lands in possession. It is to be sown in May. One bushel of seed will sow an acre, and it will grow on any soil. It ripens late in autumn, and, when mowed, it must lie upon the ground till the stalks, which are naturally hard, grow soft; it will not shed the seed in lying, nor will it get any damage by the rain. It yields a very considerable increase, and if the land be tolerable, sometimes no less than fifty or sixty bushels from an acre.

It is excellent food for hogs, poultry, and other animals. The flour of it is very white, and, mixed with wheat-flour, is used for food by the country people in some places. The straw is good fodder for cattle, and the grain is good to give to horses among their oats; but it must be broken in a mill, otherwise it will pass through them whole.

White-Cone-WHEAT, a term used by our husbandmen to express a peculiar kind of wheat, which is very strong, and has a large ear.

It is the best kind for sowing in fields subject to the blight; for the stalks of it being, for the most part solid or full of

with like a rush, not hollow like those of common wheat; the insects that cause the blight seizing on the stalks of other wheat, does this no injury, even though they should attack it; the stalks of this kind being often found full of black specks, which are always the marks of that insect having been there, and yet the ear full, and the grain good.

This wheat makes very good bread, if the miller does not grind it too small, or the baker make his dough too hard; it requiring to be somewhat larger than other wheat-flour, and somewhat softer in the dough. A bushel of white cone-wheat will make considerably more bread than a bushel of lammas-wheat; but it gives it somewhat a yellowish cast.

Smyrna-WHEAT, a peculiar kind of wheat that has an extremely large ear, with many lesser or collateral ears coming all round the bottom of the great one.

As this is the largest of all sorts of wheat, so it will dispense with the nourishment of a garden, without being overfed, and requires more nourishment than common husbandry in the large way can give it. In the common way its ears grow not much larger than those of our common wheat.

This sort of wheat seems, of all others, the most proper for the new method of horse hoeing husbandry, as that method seems capable of giving as much nourishment as the farmer pleases, by often repeating the hoeing. Next to this, the white-cone-wheat is best for this sort of husbandry; then the grey-cone wheat.

WHEAT, a common article of our food, is more glutinous and nutritious than most other kinds of grain. The flour, or the starch, prepared from it, form with water a soft viscid substance, which has been taken with good success in diarrhoeas and dysenteries. Bran contains, besides the husks or shells of the wheat, a portion of farinaceous matter: this is less glutinous than the finer flour, and is supposed to have a detergent quality. See BRAN. For the bounties upon wheat, see CORN. For the manner of preserving wheat, see the articles CORN and GRANARY.

For the manner of grinding, &c. wheat, see GRINDING, MILL, FLOUR, &c.

WHEAT-EAR, in ornithology, the english name of a species of motacilla, with a grey, black, and white forehead. See the article MOTACILLA.

WHEEL, *rota*, in mechanics, a simple machine, consisting of a round piece of wood, metal, or other matter, which revolves on an axis. The wheel is one of the principal mechanic powers: it has place in most engines; in effect, it is off an assemblage of wheels that most of our engines are composed. For the theory of this mechanic power, called axis and wheel, see AXIS *in peritrochio*.

For the theory of clock-wheels, watch-wheels, mill-weels, &c. see the articles CLOCK, MILL, &c.

With regard to the wheels of coaches, waggons, &c. otherwise called wheel-carriages, the whole doctrine thereof may be reduced to the following particulars; *viz.* 1. Wheel-carriages meet with less resistance than any other. 2. The larger the wheel the easier is the draught of the carriage. 3. A carriage upon four wheels of equal size, is drawn with less force than with two of those wheels and two of a lesser size. 4. If the load be laid on the axle of the larger wheels, it will be drawn with less force than if it had laid on the axis of the lesser wheels, contrary to the common notion of loading carriages before. 5. The carriage goes with much less force on friction-wheels than in the common way: all which will be confirmed by experiments. The wheels of carriages must be exactly round, and the felloes should be at right angles to the naves, according to the inclination of the spokes: that is, the plane of the curvature of the wheel should cut the nave at right angles, though it need not pass through the space where the spokes are inserted into the nave.

1. It is a general rule in all cases that the wheels be exactly round; for if they were not so, but like EFGH (plate CCC. fig. 1.) and the nave out of the center, it is certain, that such a wheel in turning, would be affected in the same manner upon plane ground as other wheels are when they rise and fall, and would not be in equilibrio; the wheel turning towards H would move with as much difficulty as if there was a rise to ascend; and that height being passed, it would fall on a sudden, as if a square stone was rolled along, and the jolts of the wheel would precipitate and push the horses at one time, and immediately increase their difficulty of drawing the next moment, and that in proportion to the wheels being out of round:

yet

yet if the nave should not be in the middle, the shortest part, as F, being on the ground; when such a wheel begins to turn, the weight must be raised in the same manner as when another carriage is going up an hill: and from F to D, or quite to G, the wheel would act like a wedge: and at D, or G, it would fall and drive on the horses as in a steep descent.

2. The fellys must not cross wind, but be at right angles with the naves, according to the inclination of the spokes; for otherwise the wheel in turning would find inequalities, as it happens when the hole of the nave is too big, and the wheel moves from side to side; which comes to the same purpose as if the wheel was out of round; and then the inequality of the spokes, which would be too leaning or too strait, upon the nave descending into an hole, or rising upon an eminence, opposite to their inclination would cause them, or the fellys, to break.

3. The spokes must be inclined to the naves, that the wheels may be dishing or concave. If the wheels always turned upon smooth and even ground, it is certain that the spokes ought to be straight upon the naves; that is, at right angles to their axes, because then they would bear perpendicularly, like the spoke B, (*ibid.* fig. 2.) of the nave A C, which is the strongest way for wood. But because the ground is unequal, and when the wheels fall into the ruts, that wheel which is in the rut bears a greater part of the weight than the other, because it is lower: in such a case the spokes of a dishing-wheel become perpendicular in the rut, and therefore have the greatest strength; whilst the opposite wheel, being upon higher ground, bears a less part of the weight; and, consequently, the spokes need not be at their full strength, and so will have a sufficient force, though that force be less than what they have upon even ground.

4. The axle-tree must be straight in all respects, and at right angles to the shafts or to the pole. In the motion of all bodies there is one way of moving which is the easiest of all the rest, and happens here when the axle-tree is every way straight; for if its ends should bend backwards, so as to bring the wheels nearer together behind, as A E, *ibid.* fig. 3. and spread them much before, as D C, it is certain that they could not go into

the ruts, nor turn in going forward, or at least with great difficulty dragging instead of rolling. There would be the same inconveniences in bending the axle-tree forward, so as to bring them nearer the pole as I F, fig. 4. and make them spread behind, as at B D. The less the axle-tree is bent, the less the inconvenience: but there will always be some, when the wheels are not parallel; and there will be no inconvenience when the axle is straight, and the wheels are in the situation C P and A D, fig. 5. The axle must also be at right angles to the pole or shaft; for if the pole or shafts were on one side, as at B, fig. 3. or C, fig. 4. the coach or carriage would be drawn on one side, and almost all the weight would bear upon one horse; but it must be at right angles like the pole G, fig. 5. Great wheels are always more advantageous for rolling than little ones, in any case, or upon any ground whatsoever. The wheels of carriages are considered according to the velocity and friction they have upon the axle-tree, and likewise according to their resistance, or sinking in upon the ground. If we consider them according to the friction, it is certain, that a wheel whose diameter is double that of another, will make but one turn, whilst the little one makes two for the same length of way; the circumference, which is in proportion to the diameter being double. Therefore, in respect to friction, a wheel of double the diameter will have a double advantage, there being but one turn instead of two, which doubles the friction in the small wheel. The wheel A B C, being twice as big as the wheel D E F, (*ibid.* fig. 6 and 7.) will have twice the advantage in respect of the friction, the holes of the nave and the axles being equal. See the articles FRICTION, CIRCUMFERENCE, &c.

If we consider the wheels according as they sink into the earth, or fall into holes, there will be the same advantage for the one and inconveniency for the other. If we consider the bearing, it is double in the great wheel; therefore it will sink but half the way: and if we consider hollows, it will give the same advantage in some cases; but then in others, as, for example, where the holes are deep, the little wheel will have much more disadvantage; for if it should fall into a great hole, as D E, fig. 6, 7, and 8. of a diameter, equal to that of the wheel, it would wholly sink in

whilst the great wheel would only fall in the depth of its segment AB, which would not be half the wheel, as may be seen from the parallel lines AD and BE. We may suppose the same to happen in marshy grounds, where a little wheel would sink wholly in the same hole that the great one would sink but in part, EF, *ibid.* fig. 8. is a cart, or carriage; BD a rub for the wheel CAD to pass over, AB the horizontal plane; DB, AC, perpendicular, and OD parallel, to AB, C the centre of the wheel. Then the horizontal force required to pull the wheel over the rub BD, is as $\frac{DO}{CO}$:

and the difficulty of going over rubs increases in a greater ratio than that of their heights. Also the higher the wheels, the more easily they pass over them; but then they are the more apt to overturn.

To draw the cart with the least power over the rub BD, it should not be drawn in the horizontal direction AB or OD, but in the direction AD. The advantage then of high wheels is, that they pass the rubs most easily, have the less friction, sink less in the dirt, and more easily press down an obstacle; and their disadvantage is, that they easily overturn, and make cattle draw too high; for they can apply their strength best when they draw low and upwards in the direction AD, which is the advantage of low wheels; yet if the wheels are high they may be made to draw low, by fixing the limmers or traces as far below the axle as you will, which will then be an equal advantage with low wheels. For the power not pulling at the wheel, but at the carriage, may draw from any part of it. There is another advantage in small wheels, which is, that they are better to turn with. A waggon with four wheels is more advantageous than a cart with two wheels, especially on sand, clay, &c. Narrow wheels and narrow plates are a disadvantage.

Suppose the waggon FG, fig. 9. is moved forward by a power acting within it, which power turns the wheel DE by the spokes AD, AD, &c. and DE turns the wheel IC, which carries the waggon. Let the power at A be 1,

then the force acting at E will be $\frac{DA}{DE}$:

also, if the power at E be 1, the force at C, by which the waggon is moved, will

be $\frac{BE}{BC}$: therefore the power at A, to the force with which the waggon can be moved, is as 1 to $\frac{DA \times BE}{DE \times BC}$; or the

power is to that force, as $DE \times BC$, to $DA \times BE$. It will be the same thing if, instead of teeth, the wheel DE carries EB by a chain going round them. You must suppose the like wheels on the opposite side. Hence, if the absolute force to move the waggon without, be 1, the force within applied at A to move it will be $\frac{DE \times BC}{BE \times DA}$.

6. It would be much more advantageous to make the four wheels of a coach or waggon large, and nearly of a height, than to make the fore wheels of only half the diameter of the hind wheels, as is usual in many places, which the following experiment will confirm.

Let us make use of a little waggon, or model, of an inch to a foot (represented *ibid.* fig. 10.) with the four wheels of five inches and nine lines; and so contrived that one may put on wheels of different diameters; as, for example, four or five inches, two of two inches three lines, two others of three inches, and let them have naves, spokes, and fellys, in proportion, to represent the wheels of a coach or waggon; let them be changed one after another, the waggon DB being always loaded with the same weight, A, of five pounds, and drawn by means of a silken thread running over a pulley, with a little bag, or scale of a ballance, to put in balls for the different wheels, according as they are to run upon even ground, upon earth, sand, or pavement. The board AF must be of oak, three feet long, plained on one side, and carved on the other, to imitate the pavements and the channels of streets. The paving stones must be of seven or eight lines instead of seven or eight inches, reducing them from inches to lines, as the wheels are reduced from feet to inches. It must be so contrived that the pulley may be turned to either side of the board. The whole being so disposed, the several experiments will answer a table, for which we refer the reader to Defagulier's Course of Experimental Philosophy, vol. i. page 223.

WHEEL is also the name of a kind of punishment

nishment which great criminals are put to in divers countries. In France, their assassins, parricides, and robbers on the highway, are condemned to the wheel; *i. e.* to have their bones first broken with an iron-bar on a scaffold, and then to be exposed and left to expire on the circumference of a wheel. In Germany they break their bones on the wheel itself.

WHEEL, in the military art, is the word of command, when a battalion or Squadron is to alter its front either one way or the other. To wheel to the right, directs the man in the right angle to turn very slowly, and every one to wheel from the left to the right, regarding him as their center; and *vice versa*, when they are to wheel to the left. When a division of men are on the march, if the word be to wheel to the right or to the left, then the right or left hand man keeps his ground; only turning on his heel, and the rest of the rank move about quick till they make an even line with the said right or left hand man.

WHEEL-ANIMALS, *brachionus*, a genus of animalcules which have an apparatus of arms for taking their prey. This apparatus has been supposed, by microscopical writers, to be a kind of wheels; and thence named the creatures that are possessed of it wheel-animals. This is one of the smaller animalcules; and is, by Dr. Hill, described to be, when in a state of rest, of a plain smooth body, of a conic figure, obtuse at the posterior extremity, and open at the anterior, of a dusky olive colour, and semi-transparent. When it puts itself in motion, it protrudes, from the open extremity, a part of its naked body; to the whole of which this outer-conic body seems to be but a case or sheath; from the extremity of this exerted part of the body, the creature soon after thrusts out two protuberances, which give it the appearance of a double head; and in each of these is discovered an apparatus in a continual motion, appearing a rotatory one but in reality a vibratory one very quick repeated. Each of these protruded bodies has six arms inserted into it, and these it continually shuts and opens over one another. Each of these arms is furnished with a double series of fibres at its edge, which being expanded cause it to spread to a considerable breadth. There are several species of this genus of animalcules.

WHEEZING, the name of a distempera-

ture in horses, accounted by the generality of people to be the same with that called purfiveness. See PURSIVENESS.

WHELP, the young of a dog, fox, lion, or any wild beast. Nothing is more essential to the having a good pack of hounds, than a proper care of the whelps, and of the parents from which they are to be bred. The bitches in particular should be carefully chosen, and should be such as are strong and well proportioned; they must also have large ribs and flanks. See the articles DOG and HOUND.

The whelps must have good fresh straw to lie in, and it must be often changed; they are to be kept in a place where neither the rain nor sunshine can be troublesome to them, and once a week it will be proper to anoint them all over with a little nut-oil, with some saffron infused in it. This will prevent the flies from annoying them so much as they otherwise would, and will kill worms of all kinds. When they are fifteen days old it is the custom to worm them, and a week after, one joint of their stern should be twisted off. As soon as they can see, they should have milk given them to lap; and at two months old, they should be weaned, keeping them wholly from the bitch. They must at this time be well kept, but not too high fed; and it is proper to put some cummin seed into their food, to keep the wind out of their bellies.

WHELPS, in a ship, the seaman's term for those brackets which are set up on the capstan close under the bars; they give the sweep to it, and are so contrived that the cable winding about them may not surge so much as it might otherwise do, if the body of the capstan were quite round and smooth.

WHETSTONE, *cos*, a stone which serves for the whetting of knives and other tools upon. See the article COS.

WHEY, the serum, or watery part, of milk. See the article MILK.

WHIFFLER of a company, in London, a young freeman who goes before, and waits on the company on public solemnities.

WHIG, a party in England, opposite to the Tories, from whom they differ chiefly in their political principles. See TORIES. The names of whig and tory were not known till about the middle of the reign of Charles II. when these were given as party distinctions. These parties may be considered either with regard to the State, or to religion. The state Tories are either

either violent or moderate: the first would have the king to be absolute, and therefore plead for passive obedience, non resistance, and the hereditary right of the house of Stuart. The moderate tories would not suffer the king to lose any of his prerogative; but then they would not sacrifice those of the people. The state whigs are either strong republicans or moderate ones. The first, says Rapin, are the remains of the party of the long parliament, who attempted to change the monarchy to a commonwealth: but these make so slender a figure, that they only serve to strengthen the party of the other whigs. The tories would persuade the world, that all the whigs are of this kind; as the whigs would make us believe that all the tories are violent. The moderate state whigs are much in the same sentiments with the moderate tories, and desire that the government may be maintained on the antient foundation: all the difference is, that the first bear a little more to the parliament and people, and the latter to that of the king. In short, the old whigs were always jealous of the incroachments of the royal prerogative, and watchful over the preservation of the liberties and properties of the people. In regard to religion, the whigs have always been for limiting the power of the bishops, and abolishing the convocation.

WHINE, an hunting term, used for the cry of an otter.

WHIP, or **WHIP-STAFF**, in a ship, a piece of timber, in form of a strong staff, fastened into the helm, for the steersman, in small ships, to hold in his hand, in order to move the rudder and direct the ship.

WHIP-GRAFTING. See **GRAFTING**.

WHIPPING, in angling, is the fastening a line to the hook or to the rod. It is also used for the casting in of the hook, and drawing it gently on the water.

WHIPT SYLLABUB. See **SYLLABUB**.

WHIRL-POOL, an eddy, vortex, or gulph, where the water is continually turning round. See the articles **GULPH**, **EDDY**, **VORTEX**, &c.

These in rivers are very common, from various accidents, and are usually very trivial, and of little consequence. In the sea they are more rare, but more dangerous. Sibbald has related the effects of a very remarkable marine whirlpool among the Orcades, which would prove very dangerous to strangers, though it is

of no consequence to the people who are used to it. This is not fixed to any particular place, but appears in various parts of the limits of the sea among those islands. Wherever it appears it is very furious; and boats, &c. would inevitably be drawn in and perish with it; but the people who navigate them are prepared for it, and always carry an empty vessel, a log of wood, or large bundle of straw, or some such thing, in the boat with them; as soon as they perceive the whirlpool, they toss this within its vortex, keeping themselves out: this substance, whatever it be, is immediately received into the centre and carried under water; and as soon as this is done, the surface of the place where the whirlpool was becomes smooth, and they row over it with safety; and in about an hour they see the vortex begin again in some other place, usually at about a mile distance from the first.

WHIRL-WIND, a wind that rises suddenly, is exceeding rapid and impetuous when risen, but is soon spent. See the articles **WIND** and **HURRICANE**.

There are divers sorts of whirlwinds, distinguished by their peculiar names; as the prester, typho, turbo, exhydria, and ecnephas. The prester is a violent wind, breaking forth with flashes of lightning. This is rarely observed; scarce ever without the ecnephas. Seneca says it is a typho or turbo kindled or ignited in the air. See the article **PRESTER**.

The ecnephas is a sudden and impetuous wind, breaking out of some cloud, frequent in the Ethiopic sea, particularly about the cape of Good Hope. The seamen call them travados. The exhydria is a wind bursting out of a cloud with a great quantity of water. This only seems to differ in degree from the ecnephas, which is frequently attended with showers. A typho, or vortex, most properly called whirl-wind, or hurricane, is an impetuous wind, turning rapidly every way, and sweeping all round the place. It usually descends from on high. It is frequent in the Eastern-ocean, chiefly about Siam, China, &c. and renders the navigation of those parts exceeding dangerous. See the articles **VORTEX**, **SPOUT**, &c.

WHISPERING. See the articles **HEARING**, **ATTENTION**, &c.

WHISPERING-PLACES depend upon this principle. If the vibrations of the tremulous body are propagated through a
long

long tube, they will be continually reverberated from the sides of the tube into its axis, and by that means prevented from spreading, till they get out of it; whereby they will be exceedingly increased, and the sound rendered much louder than it would otherwise be. See the article **SOUND**.

Hence it is, that sound is conveyed from one side of a whispering-gallery to the opposite one, without being perceived by those who stand in the middle. The form of a whispering-gallery is that of a segment of a sphere, or the like arched figure; and the progress of the sound through it may be illustrated in the following manner: Let ABC (plate CCXCVII. fig. 4.) represent the segment of a sphere; and suppose a low voice uttered at D, the vibrations expanding themselves every way, some will impinge upon the points E, E, &c. and from thence be reflected to the points F, from thence to G, and so on till they all meet in C, and, by their union there, cause a much stronger sound than in any part of the segment whatever, even at D, the point from whence they came. Accordingly, all the contrivance in whispering places is, that near the person who whispers there may be a smooth wall, arched either cylindrically or elliptically. A circular arch will do, but not so well. See **ARCH**, **ECHO**, **PHONICS**, &c.

The most considerable whispering places in England are, the whispering-gallery in the dome of St. Paul's, London, where the ticking of a watch may be heard from side to side, and a very easy whisper be sent all round the dome. The famous whispering place in Gloucester cathedral, is no other than a gallery above the east end of the choir, leading from one side thereof to the other. It consists of five angles and six sides, the middlemost of which is a naked window, yet two whisperers hear each other at the distance of twenty-five yards.

WHIST, a well-known game at cards; so called from the silence observed during the play, which is like that of honours and ruff. See **HONOURS** and **ruff**.

However, as there are many ways of cheating practised at this game, we shall only mention a few, to put the unwary upon their guard. Some by winking, shutting their eyes, placing their fingers, or other signs, find means to let their partners know what honours they have got: others have a way of cutting ho-

nours either to their partners or themselves: the dealer is often crafty enough to conceal some honours for himself: but the best way of looking is by means of brief-cards; for all the honours being somewhat broader than the rest, your adversary must always cut you an honour.

WHISTLE-FISH, the cirrated gadus, with a furrow at the first back fin, being a small species, usually about eight inches long, and its thickness not great in proportion. See the article **GADUS**.

WHITBY, a port-town of the north riding of Yorkshire, situated on the German-sea, thirty-eight miles north-east of York.

WHITCHURCH, a borough-town of Hampshire, situated ten miles north of Winchester.

It sends two members to parliament.

WHITE, one of the colours of natural bodies. See the article **COLOUR**.

White is not so properly said to be any one colour, as a composition of all colours; for it is demonstrated by Sir Isaac Newton, that those bodies only appear white, which reflect all the kinds of coloured rays alike. See **WHITENESS**.

WHITE, in painting in miniature, &c. The best white for painting in water-colours, is flake white, which is better than white lead; and if it be pure, far exceeds it in beauty; because white lead is apt to turn blackish, especially if it be used in a hard water: but if you use white lead, first rectify it with white wine vinegar in the following manner: grind well the finest white lead upon a porphyry with vinegar; then put it into a glass of water, stir it about, and presently pour off the water, while it is white, into some other clean glass or vessel; let it settle, and then pour off the water from it, and it will be exceeding fine. When this white is settled put to it gum-water, to bind it and give it a glaze.

Some recommend a white made of the whiter part of oyster-shells, reduced into an impalpable powder; this is called pearl-white, and will mix with any colour. Some also recommend the powder of egg-shells of the brightest colour, and well cleaned and washed, ground with gum-water, to which may be added about a twentieth part of white sugar-candy: the egg-shells should be ground to an impalpable powder. Experience proves, that egg-shell powder is of very great service as a white in water colours, and both that and the powder of oyster-shells, well rectified

rectified and mixed with the white of an egg well beaten, will make an extraordinary mixture in other colours, and will correct them from changing or altering their qualities.

WHITE of the eye, denotes the first tunic or coat of the eye, called albuginea and conjunctiva, because it serves to bind together, or inclose, the rest. See **EYE**.

WHITE-FRIARS, a name common to several orders of monks, from their being clothed in a white habit. See **MONK**.

WHITE-HART silver, a mulct or tribute paid into the exchequer, out of certain lands in or near the forest of White-hart in Dorsetshire; imposed by Henry III. upon Thomas de la Linde, for killing a beautiful white hart which that prince had before spared in hunting.

WHITE-HORSE, in ichthyology, the prickly backed raia, with two series of prickles on the tail, and one series over each eye. See the article **RAIA**.

This is a singular species, the body is considerably broad in proportion to its length, but it is also thick; the back is somewhat gibbous, but the belly is more flat; the rostrum is oblong and acute, the eyes are prominent, and there is an aperture behind each; the mouth is transverse and large, and furnished with a number of sharp teeth; the apertures of the gills run down from it on each side along the breast, they are small, and there are five of them on each side.

WHITE-LEAD, also called ceruse. See the article **CERUSE**.

WHITE LINE, among printers, a void space of the depth or breadth of a line. See the article **PRINTING**.

WHITE-MEATS, include milk, butter, cheese, white-pots, custards, and other kinds of food made of milk or eggs. Some also add chickens, veal, and fish.

WHITE-POT, milk or cream beat up with the yolks of eggs, mixed with sugar and spice, and baked in an earthen dish, with slices of bread in it.

The cooks furnish us with a variety of dishes under this denomination; as the rice white-pot, Westminster white-pot, Norfolk white-pot, &c.

WHITE-RENT, a rent or duty of 8 d. paid annually by every tinner in the county of Devon, to the duke of Cornwall.

WHITE-SEA, in geography, a bay of the frozen ocean, in the north of Muscovy, between Russian Lapland, and Samoiëda.

Spanish. **WHITE**, a kind of focus used by

ladies to heighten the complexion, and hide its defects.

It is made of tin-glass dissolved in spirit of nitre, and precipitated into a very fine powder by means of salt-water.

WHITE-WINE, wine of a bright transparent colour, bordering on white, thus called to distinguish it from the red wines. See the article **WINE**.

The generality of white-wines are made from white grapes; though there are some from black ones, only the skins are kept from tinging them.

WHITEHAVEN, a port-town of Cumberland, situated on the Irish channel: west long. $3^{\circ} 16'$, north lat. $54^{\circ} 30'$.

WHITENESS, *albedo*, the quality which denominates a body white. See the articles **WHITE** and **COLOUR**.

Sir Isaac Newton shews, that whiteness consists in a mixture of all the colours; and that the light of the sun is only white, because consisting of rays of all colours. See the article **RAY**.

From the multitude of rings of colours which appear upon compressing two prisms or object-glasses of telescopes together, it is manifest that these do so interfere and mingle with one another at last, as, after eight or nine reflections, to dilute one another wholly, and constitute an even and uniform whiteness; whence, as well as from other experiments, it appears, that whiteness is certainly a mixture of all colours, and that the light which conveys it to the eye, is a mixture of rays endued with all those colours. See the article **LIGHT**.

The same author shews, that whiteness, if it be most strong and luminous, is to be reckoned of the first order of colours; but if less, as a mixture of the colours of several orders. Of the former sort he reckons white metals, and of the latter, the whiteness of froth, paper, linnen, and most other white substances. And as the white of the first order is the strongest that can be made by plates of transparent substances, so it ought to be stronger in the denser substances of metals than in the rarer ones of air, water, and glass. Gold or copper mixed either by fusion, or amalgamation with a very little mercury, with silver, tin, or regulus of antimony, becomes white, which shews both that the particles of white metals have much more surface, and therefore are smaller than those of gold and copper, and also that they are so opaque, as not to

suffice

suffer the particles of gold or copper to shine through them. And as that author doubts not but that the colours of gold and copper are of the second and third order, therefore the particles of white metals cannot be much bigger than is requisite to make them reflect the white of the first order. See **PARTICLE**.

WHITING, in ichthyology, the english name for the white gadus with no beard, and with three fins on the back, and the upper jaw longest. See **GADUS**.

The head and body of this species is compressed, the back is convex, the anus is at a great distance from the tail, and is, indeed, very near the head; the colour of the whole fish is a silvery white, except that on the back there is an admixture of a blackish tinge; the scales are very small, roundish and white; the nostrils have each a double aperture, and are placed high; the eyes are very large, the iris silvery, and the pupil large and blue; the teeth are very numerous; the pectoral fins have each twenty-one rays, and the ventral fins have each six rays; the pinnæ ani are two, and have, the first thirty-three, and the second twenty-two rays. This species is frequent in our seas, and much esteemed at our tables.

WHITING-POLLOCK, in ichthyology, a species of gadus with three back fins, the lower jaw longest, and the lateral line crooked. See **GADUS**.

The usual length of this fish is from eight to thirteen inches; it is considerably thick in proportion, and in most other respects resembles the common whiting.

WHITES, in medicine, the same with fluor albus. See **FLUOR ALBUS**.

WHITLOW, in medicine. See the article **PARONYCHIA**.

WHITSUNDAY, a solemn festival of the christian church, observed on the fiftieth day after Easter, in memory of the descent of the Holy Ghost upon the apostles in the visible appearance of fiery cloven tongues, and of those miraculous powers which were then conferred upon them.

It is called Whitsunday, or White-sunday, because this being one of the stated times for baptism in the antient church, those who were baptised put on white garments, as types of that spiritual purity they received in baptism. As the descent of the Holy Ghost upon the apostles happened upon the day which the Jews called pentecost, this festival retained the name of pentecost among the christians.

VOL. IV.

WHOODINGS, or **HOODINGS**, a sea-term, used for planks joined and fastened along the ship's sides into the stem.

WHORE, a woman who prostitutes herself for hire. See the articles **CONCUBINE**, **COURTESAN**, and **HARLOT**.

WHORLBAT, or **HURLBAT**, a kind of gauntlet, or leathern strap, loaden with plummets; used by the antient Romans in their solemn games and exercises, and by them called *cæstus*. See **CÆSTUS**.

WHUR, in falconry, denotes the fluttering of partridges or pheasants, as they rise.

WIBURG, the capital of the territory of the same name in Jutland: east long. $9^{\circ} 16'$, north lat. $56^{\circ} 20'$.

WIBURG, a city and port-town of russian Finland, situated on the gulph of F. n. land: east long. 29° , north lat. 61° .

WIC, a place on the sea shore, or on the bank of a river: though it properly signifies a town, village, or dwelling place; and sometimes a machine.

WICCOMB CHIPPING, a borough-town of Bucks, twelve miles south of Aylesbury. It sends two members to parliament.

WICK DE DUERSTED, a town of the United Netherlands, in the province of Utrecht, fifteen miles south-east of the city of Utrecht.

WICKER, a twig of the osier shrub, single or wrought.

WICKET, a small door in the gate of a fortified place, &c. or a hole in a door, through which to view what passes without.

WICKLIFFISTS, or **WICKLIFFITES**, a religious sect which sprung up in England in the reign of Edward III. and took its name from John Wickliff, doctor and professor of divinity in the university of Oxford, who maintained that the substance of the sacramental bread and wine remained unaltered after consecration; and opposed the doctrine of purgatory, indulgences, auricular confession, the invocation of saints, and the worship of images. He maintained, that the children of the religious may be saved without being baptized; that priests may administer confirmation; that there ought to be only two orders in the church, that of priests, and that of deacons. He made an english version of the Bible, and composed two volumes, called *Aletheia*, that is Truth, from which John Huss learned most of his doctrines. In short, to this reformer we owe the first hint of the reformation, which was effected about two hundred years after.

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WICKLOW, a county of Ireland, in the province of Leinster, bounded by the county of Dublin, on the north; by the Irish channel, on the east; by Wexford, on the south; and by Kildare and Katerlagh, on the west.

WICKWARE, a market-town of Gloucestershire, situated twenty miles south of Gloucester.

WIDGEON, in ornithology, the anas with a brown head, white front, and a tail black underneath. See *ANAS*.

WIDOW, a woman who has lost her husband.

In London, a freeman's widow may exercise her husband's trade, as long as she continues such.

Marriage with a widow, in the eye of the canon law, is a kind of bigamy.

WIDOW of the king, was she who after her husband's death, being the king's tenant in capite, could not marry again without the king's consent.

WIFE, a married woman, or one joined with, and under the protection of, an husband. See the article *HUSBAND*.

A wife, in our english law, is termed *feme covert*; and in the judgment of the law is reputed to have no will, as being supposed intirely under, and subject to, that of her husband. See the articles *COVERTURE* and *BARON and FEME*.

The wife can make no contract without the husband's consent; and if any goods or chattels be given her, they all immediately become her husband's: even necessary apparel is not her's in property. All her personal chattels, which she held at her marriage, are so much her husband's, that after his death they shall not return to her, but go to the executor or administrator of her husband, except only her paraphernalia. See the article *PARAPHERNALIA*.

The wife partakes of the honour and condition of her husband; but none of her dignities come by marriage to her husband; and as the law supposes the husband to have the full power over his wife, he is obliged to answer for all her faults and trespasses. If a wife bring forth a child begot by a former husband, or any other, before marriage, but born after marriage with another man; this latter must own the child; and that child shall be his heir at law: and if a wife bring forth a child during her husband's absence, though it be of many years; yet if he lived all the time within the island, he must father the child, and the child,

if first born, shall inherit. If the wife has a jointure, and during her marriage is made pregnant by her husband, which must appear by the child's being born alive, the husband shall have all his wife's lands for life; but if the wife have no jointure settled before marriage, she may, after her husband's death, challenge the third part of his yearly rents of land, during her life.

WIGGAN, a borough-town of Lancashire, twenty-nine miles south of Lancaster.

It sends two members to parliament.

Ile of **WIGHT**, part of the county of Southampton, and separated from it by a narrow channel, is about twenty miles long, and twelve broad. The chief town is Newport.

WIGTOWN, a borough and port-town of Scotland, in the shire of Galloway, situated on a bay of the Irish channel, ninety miles south-west of Edinburgh.

WIHITSCH, a frontier town of Bosnia, in european Turkey: east long. $16^{\circ} 40'$, north lat. $45^{\circ} 30'$.

WILDS, a term used by our farmers to express that part of a plough by which the whole is drawn forwards. See *PLOUGH*.

WILDERNESS, in gardening, a kind of grove of large trees, in a spacious garden, in which the walks are commonly made either to intersect each other in angles, or have the appearance of meanders and labyrinths. See the articles *GROVE* and *LABYRINTH*.

Wildernesses, says Mr. Miller, should always be proportioned to the extent of the gardens in which they are made; for it is very ridiculous to see a large wilderness planted with tall trees in a small spot of ground; and, on the other hand, nothing can be more absurd, than to see little paltry squares, or quarters of wilderness-work, in a magnificent large garden. As to the situation of wildernesses, they should never be placed too near the habitation, nor so as to obstruct any distant prospect of the country; there being nothing so agreeable as an unconfined prospect; but where, from the situation of the place, the sight is confined within the limits of the garden, nothing can so agreeably terminate the prospect, as a beautiful scene of the various kinds of trees judiciously planted; and if it is so contrived, that the termination is planted circularly, with the concave towards the sight, it will have a much better effect, than if it end in strait lines or angles.

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The plants should always be adapted to the size of the plantation; for it is very absurd for tall trees to be planted in the small squares of a little garden; and in large designs small shrubs will have a mean appearance. It should also be observed, never to plant ever-greens amongst deciduous trees; but always to place the ever-greens in a wilderness in a separate part by themselves, and that chiefly in sight.

As to the walks, those that have the appearance of meanders, where the eye cannot discover more than twenty or thirty yards in length, are generally preferable to all others, and these should now and then lead into an open circular piece of grass; in the center of which may be placed either an obelisk, statue, or fountain; and, if in the middle of the wilderness there be contrived a large opening, in the center of which may be erected a dome or banquetting-house, surrounded with a green plot of grass, it will be a considerable addition to the beauty of the whole. From the sides of the walks and openings, the trees should rise gradually one above another to the middle of the quarters, where should always be planted the largest growing trees, so that the heads of all the trees may appear to view, while their stems will be hid from the sight. Thus in those parts which are planted with deciduous trees, roses, honey-suckles, spiræa frutex, and other kinds of low-flowering shrubs, may be planted next the walks and openings; and at their feet, near the sides of the walks, may be planted primroses, violets, daffodils, &c. not in a straight line, but so as to appear accidental, as in a natural wood. Behind the first row of shrubs should be planted syringas, althæa frutex, mezerions, and other flowering shrubs of a middle growth; and these may be backed with many other sorts of trees, rising gradually to the middle of the quarters.

The part planted with ever-greens, may be disposed in the following manner, *viz.* in the first line next the great walks, may be placed the laurus-tinus, boxes, spurge-laurel, juniper, favin, and other dwarf ever-greens. Behind these may be placed laurels, hollies, arbutuses, and other ever-greens of a larger growth. Next to these may be planted alaternuses, phyllireas, yews, cypresses, virginian cedars, and other trees of the same growth; behind these may be planted Norway and silver firs, the true pine, and other sorts of the

fir growth; and in the middle should be planted Scotch pines, pinaster, and other of the larger growing ever-greens, which will afford a most delightful prospect, if the different shades of the greens are curiously intermixed.

But beside the grand walks and openings (which should always be laid with turf, and kept well mowed) there should be some smaller serpentine-walks through the middle of the quarters, where persons may retire for privacy; and by the sides of these private walks may also be scattered some wood flowers and plants, which, if artfully planted, will have a very good effect.

In the general design for these wildernesses, there should not be a studied and stiff correspondency between the several parts; for the greater diversity there is in the distribution of these, the more pleasure they will afford.

WILKOMERS, a city of Poland, in the duchy of Lithuania: east long. 25°, north lat. 55° 30'.

WILL, or *last* WILL, in law, signifies the declaration of a man's mind and intent relating to the disposition of his lands, goods, or other estate, or of what he would have done after his death.

In the common law, there is a distinction made between a will and a testament; as that is called a will, where lands or tenements are given; and when the disposition concerns goods and chattels alone, it is termed a testament. See the article TESTAMENT.

A will, though it has no force till after the testator's decease, does then, without any other grant, or livery, &c. give and transfer estates, and alter the property either of lands or goods, as effectually as any deed or conveyance executed in a person's life-time, and thereby disents may be prevented, estates in fee, tail, for life, or for years, be made, and he that takes lands by devise is in the nature of a purchaser. Formerly a person could not give away by will those lands that he had by descent, though he might such as he enjoyed by way of purchase; but by 34 and 35 of Hen. VIII. c. 5. all persons that have a sole estate in fee-simple of any lands, tenements, &c. may devise the same by will at their pleasure, to whom they think fit; and this extends to persons seized in coparcenary, or as tenants in common; but lands intailed are not devisable, only those held in fee, and goods and chattels: but wills made

by infants or feme coverts, ideots, and persons not of sound memory, are deemed not good in law. The 29 Car. II. c. 23. has enacted, that all wills and devises of lands, &c. shall be in writing, signed by the devisor, or some other by his expresse directions, in the presence of at least three credible witnesses; and no will made in writing shall be revoked, but by another will, or cancelling the same by the testator himself, or by his direction.

In the making of a will there are these several rules to be observed, *viz.* 1. That it be done while the testator is of sound mind and memory. 2. That there be two parts thereof, the one to remain in the hands of the party that made it; and the other in the custody of some friend, in order to render it less liable to be suppressed after the testator's death. 3. That the whole be written in one hand writing, and, if possible, in one sheet of paper or parchment. 4. In case there be more sheets than one, that the testator sign and seal every sheet, before the witnesses present at the execution. For the manner of proving a will, see the article PROBATE.

WILL with a *wisp*, or *Jack* with a *lanthorn*, a meteor known among the people under these names, but more usually among authors under that of *ignis fatuus*. See the article METEOR.

This meteor is chiefly seen in summer-nights, frequenting meadows, marshes, and other moist places. It seems to arise from a viscous exhalation, which being kindled in the air, reflects a sort of thin flame in the dark, without any sensible heat. See HEAT and PHOSPHORUS.

It is often found flying along rivers, hedges, &c. by reason it there meets with a stream of air to direct it. The *ignis fatuus*, says Sir Isaac Newton, is a vapour shining without heat; and there is the same difference between this vapour and flame, as between rotten wood shining without heat, and burning coals of fire. See the article LIGHT, &c.

WILLIAMSBURG, capital of the colony of Virginia, situated in James-county, between James-river and York-river: west long. $76^{\circ} 30'$, north lat. $37^{\circ} 20'$.

WILLIAM'S FORT, a fort belonging to the english East-India company, situated on the western branch of the river Ganges, in the province of Bengal: east long. 87° , north lat. $22^{\circ} 45'$.

WILLIAMSTAT, a port-town of Holland, situated on the sea called Hollands-Deep, fourteen miles south of Rotterdam.

WILLOW, *salix*, in botany. See the article SALIX.

WILNA, a city of Poland, capital of the great dutchy of Lithuania, situated on a river of the same name: east long. $25^{\circ} 15'$, north lat. 55° .

WILTON, a borough-town of Wiltshire, situated on the river Willey, six miles north-west of Salisbury.

It sends two members to parliament.

WILTSHIRE, a county of England, bounded by Gloucestershire and Oxfordshire, on the north; by Berkshire and Hampshire, on the east; by Dorsetshire, on the south; and by Somersetshire, on the west.

WIMPFEN, a town of Germany, in the palatinate of the Rhine, situated on the river Neckar, twenty miles east of Heidelberg.

WIMPLE, a muffer, or plaited linen-cloth, which nuns wear to cover their neck and breasts. The word is sometimes used for a streamer or flag. See FLAG.

WIN, in the beginning or end of the names of places, signifies that some great battle was fought, or a victory gained there.

WINCHELSEA, a borough and port-town of Suffex, situated on a bay of the English channel, thirty miles east of Lewes.

It sends two members to parliament.

WINCHESTER, the capital city of Hampshire, situated on the river Itching, sixty-five miles south-west of London.

WIND, *ventus*, in physiology, a stream of air, flowing out of one place, or region, into another. See the article AIR.

As the air is a fluid, its natural state is that of rest, which it endeavours always to keep or retrieve by an universal equilibrium of all its parts. When, therefore, this natural equilibrium of the atmosphere happens by any means to be destroyed in any part, there necessarily follows a motion of all the circumjacent air towards that part, to restore it; and this motion of the air is what we call wind. See ATMOSPHERE.

Hence, with respect to that place where the equilibrium of the air is disturbed, we see the wind may blow from every point of the compass at the same time; and those who live northwards of that point, have a north wind; those who live southwards, a south wind; and so of the rest: but those who live on the spot, where all these



these winds meet and interfere, are oppressed with turbulent and boisterous weather, whirl-winds, and hurricanes; with rain, tempest, lightning, thunder, &c. For sulphureous exhalations from the south, torrents of nitre from the north, and aqueous vapours from every part, are there confusedly huddled, and violently blended together, and rarely fail to produce the phenomena above-mentioned. See RAIN, LIGHTNING, &c.

Many are the particular causes which produce wind by interrupting the equipoise of the atmosphere; but the most general causes are two, *viz.* heat, which, by rarifying the air, makes it lighter in some places than it is in others; and cold, which, by condensing it, makes it heavier. Hence it is, that in all parts over the torrid zone, the air being more rarified by a greater quantity of the solar rays, is much lighter than in the other parts of the atmosphere, and most of all over the equatorial parts of the earth. And since the parts at the equator are most rarified, which are near the sun; and those parts are, by the earth's diurnal rotation eastward, continually shifting to the west; it follows, that the parts of the air which lie on the west side of the point of the greatest rarefaction, and, by flowing towards it, meet it, have less motion than those parts on the east side of the said point, which follow it; and therefore the motion of the eastern air would prevail against that of the western air, and so generate a continual east-wind, if this were all the effect of that rarefaction. But we are to consider, that as all the parts of the atmosphere are so greatly rarified over the equator, and all about the poles greatly condensed by extreme cold, this heavier air from either poles is constantly flowing towards the equator, to restore the balance destroyed by the rarefaction and levity of the air over those regions: hence, in this respect alone, a constant north and south wind would be generated.

We find by experience, that people in general have but an obscure idea or confused notion of the cause of this perpetual current of air from east to west, or of a constant east wind under the equator. Therefore, in order to elucidate this matter, we shall explain it by a figure. Let CBADE (plate CCCI. fig. 1. n^o 1.) be part of a section of the atmosphere over the equator, C the east,

E the west, A the point to which the sun S is vertical, and R the point of greatest rarefaction, or that where the air is most of all heated, and, consequently, lightest. That this point R is on the eastern side of the point A, is not difficult to be conceived, when what is said under the article TIDE, is well considered. And, because the air at R is by supposition lighter than where it is colder at C and D, it is plain that in order to obtain an equilibrium (which is necessary in a fluid body) the air by its greater weight will have a tendency from C and D towards R, and rise to a height there greater than at C or D, in proportion as its density is less.

Now this being the case, it is evident, the sun, being always between the points R and D, will be heating the air on that part; and those regions between R and C, having been deserted by the sun, will grow cold: consequently, the air between C and R, as it is colder, will likewise be heavier than that between R and D which is hotter, and so will have a greater momentum, or quantity of motion, towards the point R; and since this point R is constantly moving after the point A westward, the motion of the western air towards it, will be in part diminished by that means; and being also inferior in quantity to the motion of the eastern air, the latter will prevail over it, and be constantly following the said point R from east to west, and thus produce a continual east wind.

It may, perhaps, be here said, that tho' the motion of the air be less from D to R, yet it is something, and so there ought to be a western wind, at least in some degree, and to some distance westward of the point R. To which we answer, that the nature of a fluid will not permit two contrary motions to restore or sustain an equilibrium (we mean in regard of the whole body of it) for wherever one part of the fluid is determined to move, all the rest must necessarily follow it; otherwise the equilibrium of the air would be destroyed in one part to make it good in another, a defect which nature cannot be guilty of. Thus, we see the tides of the ocean always follow the course of the moon from east to west, without any motion of the waters from the west towards the moon, in the open oceans; and the point R can only be considered as the aerial tide, or flood of

of high air; and has nearly the same phenomena with aqueous tides. See the article TIDES.

This being clearly understood, all the rest is easy; for no one can find it difficult to conceive how the cold air from each pole must necessarily set in towards the equator directly, where meeting and interfering with the eastern current, it does with that compound a new direction for the moving air which lies between both the former. *viz.* a north-east current on the north side, and a south east on the south side: all which naturally results from the doctrine of the composition of oblique forces. See FORCE.

And this we find to be verified in the general trade-winds, which constantly blow from the north-east and south east, to about thirty degrees on each side the equator, where those parts are over the open ocean, and not affected with the reflection of the sun beams from the heated surface of the land; for in this case the wind will always set in upon the land, as on the coast of Guinea, and other parts of the torrid zone, we know it does.

Velocity and force of the WIND. As the motion of the air has a greater or lesser velocity, the wind is stronger or weaker; and it is found from observation, that the velocity of the wind is various, from the rate of 1 to 50 or 60 miles per hour. The best way to prove this, is to chuse a free open place, where the wind or current of air is not at all interrupted, but flows uniformly, or as much so as the undulatory state of the atmosphere will admit: in such a place, a feather, or other very light body, is to be let go in the wind; and then, by a half-second watch, or pendulum, you must observe nicely to what distance it is carried in any number of half-seconds, or in how many half-seconds it has passed over a given or measured space. This will give the rate of velocity in the wind per second, and of course per hour; which has been found, at a medium, to be 12 or 15 miles per hour: even the most vehement wind does not fly above 50 or 60 miles per hour; and sometimes the wind is so slow as not to exceed the velocity of a person riding or walking in it; and in that case, if the person goes with the wind, he finds no wind at all, because there is no difference of velocity, or no relative wind, which is that only which we are sensible of, whilst in motion,

The best method to estimate the force of the wind, is by means of the following anemometer. ABCDEFGHI (*ibid.* n° 2.) is an open frame of wood, firmly supported by the shaft or postern I. In the cross-pieces HK, LM, is moved an horizontal axis QM, by means of the four sails *ab, cd, ef, gh*, in a proper manner exposed to the wind. Upon this axis is fixed a cone of wood MNO, upon which, as the sails move round, a weight S, is raised, by a string on its superficies, proceeding from the small to the largest end NO. Upon the great end or bafe of the cone is fixed a ratchet-wheel *ik*, in whose teeth falls the click X, to prevent any retrograde motion from the depending weight.

From the structure of this machine, it is easy to understand, that it may be accommodated to estimate the variable force of the wind, because the force of the weight will continually increase, as the string advances on the conical surface, by acting at a greater distance from the axis. And therefore, if such a weight be put on, on the smallest part at M, as will just keep the machine in equilibrio with the weakest wind; then, as the wind becomes stronger, the weight will be raised in proportion, and the diameter of the bafe of the cone NO, may be so large in comparison of that of the smaller end or axis at M, that the strongest wind shall but just raise the weight to the great end.

Thus, for example, let the diameter of the axis be to that of the bafe of the cone NO, as 1 to 28, then if S be a weight of 1 pound at M, on the axis, it will be equivalent to 28 pounds, or $\frac{1}{28}$ of an hundred, when raised to the greatest end. If, therefore, when the wind is weakest, it supports 1 pound on the axis, it must be 28 times as strong to raise the weight to the bafe of the cone. Thus may a line of 28 equal parts be drawn on the side of the cone, and the strength of the wind will be indicated by that number on which the string shall at any time hang.

The string may also be of such a size, and the cone of such a length, that there may be sixteen revolutions of the string betwixt each division of the scale on the cone, whence the strength of the wind will be expressed in pounds and ounces. And if greater exactness be required, let the periphery of the cone's bafe be divided into 16 equal parts; then, whenever the equilibrium happens, the string will leave the conic surface against one of those

those divisions, and thus shew the force of the wind to a dram avoirdupoise weight.

Cardinal WINDS, are those which blow from the east, west, north, and south, which are called cardinal points.

Collateral WINDS, are those which blow between the cardinal points. The number of these is infinite, as the number of points they blow from are; a few of them only are considered in practice, and these have names compounded of the cardinal points between which they blow. See the article COMPASS.

WIND GUN, or **AIR-GUN**. See **AIR-GUN**.

WIND-MILL, a kind of mill, the internal parts of which are much the same with those of a water-mill; from which however it differs, in being moved by the impulse of the wind upon its vanes, or sails, which are to be considered as a wheel on the axle. See the articles **MILL** and **AXIS**.

A description of the mechanism of this useful engine, will, no doubt, be acceptable to our readers. **AHO** (pl. CCCI. fig. 2. n° 1.) is the upper room; **HOZ**, the under one; **AB**, the axle-tree, going quite through the mill; **STVW**, the sails, covered with canvas, set obliquely to the wind, and going about in the order **STVW**; **CD**, the cog-wheel, of about 48 cogs, *a, a, a, &c.* which carry round the lantern **EF**, of 8 or 9 roundles *c, c, c, &c.* together with its axis **GN**; **IK** is the upper mill-stone; and **LM**, the lower one. **QR** is the bridge, supporting the axis or spindle **GN**: this bridge is supported by the beams *cd*, **XY**, wedged up at *c, d*, and **X**. **ZY** is the lifting-tree, which stands upright; *ab, ef*, are levers, whose centers of motion are **Z** and *e*; *fghi* is a cord, with a stone *i*, going about the pins *g* and *h*, and serving as a ballance or counterpoise. The spindle **GN** is fixed to the upper mill-stone **IK**, by a piece of iron called the rind, and fixed in the under side of the stone; which is the only one that turns about, and its whole weight rests upon a hard stone, fixed in the bridge **QR**, at **N**. The trundle **EF**, and axis **Gt**, may be taken away; for it fixes on the lower part at *t*, by a square socket, and the top runs in the edge of the beam *av*. Putting down the end *f*, of the lever *fe*, raises *b*, which raises **ZY**, which raises **YX**, and this raises the bridge **QR**, with the axis **NG**, and the upper stone **IK**; and thus

the stones are set at any distance. The lower immoveable stone is fixed upon strong beams, and is broader than the upper one. The flour is conveyed through the tunnel *no*, down into a chest. **P** is the hopper, into which is put the corn, which runs along the spout *r*, into the hole *t*, and so falls between the stones, where it is ground. The axis **Gt** is square, which shaking the spout *r*, as it goes round, makes the corn run out; *rs* is a string going about the pin *t*, and serving to move the spout nearer or farther from the axis, so as to make the corn run faster or slower, according to the velocity and force of the wind. And when the wind is great, the sails **S, T, V, W**, are only part, or one side of them, covered; or perhaps only a half of two opposite sails. Towards the end **B**, of the axle-tree, is placed another cog-wheel, trundle, and mill-stones, with exactly the same apparatus; so that the same axle tree carries two stones at once: and when only one pair is to grind, the trundle **EF**, and axis **Gt** is taken out from the other. *xyl* is a girt of pliable wood, fixed at the end *x*; and the other end *l*, tied to the lever *km*, moveable about *k*. And the end *m* being put down, draws the girt *xyl* close to the cog wheel; whereby the motion of the mill is stopped at pleasure: *pq* is a ladder going into the higher part of the mill; and the corn is drawn up by means of a rope, rolled about the axis **AB**, when the mill is going.

In mills built of wood, the whole body of the mill turns round to the wind, on a tamplin, or perpendicular post; but in those of stone, only the upper part turns in this manner. See the mill-house represented *ibid.* n° 2. where 1 is the house itself, which is turned about to the wind by a man, with the help of the lever or beam 2: 3, is a roller to hoist up the steps 4.

In those built of stone, only the roof **E** (*ibid.* n° 3.) together with axis and sails **AB, CD**, turn round; in order to which, the roof is built turret-wise, the turret being encompassed with a wooden ring, in which is a groove, at the bottom of which a number of brags-truckles are placed at a certain distances; and within this groove is another ring, upon which the whole turret stands. To the upper or moveable ring are connected beams with a rope, by means of which, and a windlass below, the top of the machine, together with the sails, may be turned round,

round, and put in the direction required.

Position of, and force of the WIND, upon the sails. As to the position of the sails, we must consider, that if they are placed direct to the wind, or at right angles to the axis of the mill, they will receive the whole force of the wind, which in this case will tend to blow them forward, and consequently to blow down the mill; which position of course cannot be admitted.

If the sails are set right to the wind, or parallel with the axis of the mill, it is plain that in that position the wind cannot act upon them at all, and therefore they cannot be turned round, nor the mill put in motion; which position of the sails must likewise be rejected.

Since neither the direct nor right position of the sails will do, an oblique position must, as there can be no other. Now to shew that an oblique position of the sails will turn the mill, let AB (*ibid.* n^o 4.) be the axis, CD a sail, and its angle of obliquity (*viz.* that which it makes with the axis) be ECG ; then if GC be the force of the wind in the direct position of the sail, GE will be the force of the wind in its oblique position (as being the sine of the angle of incidence GCE .) But the force GE is resolvable into two others, EF and GF ; of which the latter, being parallel to the axis, avails nothing in turning the sail about it; but the other, EF , being perpendicular thereto, is wholly spent in compelling the sail to turn round: which was the thing to be shewn.

The force of the wind on the sail will be as the square of the sine of incidence, or as GE^2 ; for the force of each single particle of air will be as the sine GE ; and it will be also as the number of particles which strike at the same time, which number of particles is also as the sine of incidence GE . For let CD represent the section of the sail in a direct position, and CG the same in an oblique position, it is plain the number of particles striking it in the former case, will be to the number striking it in the latter, as CD to CF , which is equal to GE , the sine of incidence; for all the particles between AD and BF , will not come upon the sail in the oblique position CG . Since then the force of the wind on the sail is on two accounts as GE , it will be as the square of the said line GE .

If we suppose the velocity of the wind to vary, the force thereof will be as the square of the velocity; for the greater

the velocity, the greater will be the stroke of each single particle, and also the greater will be the number of particles coming upon the sail in the same time; the force will be therefore as the squares of the velocity.

Again, if the area of the sail be variable, the force of the wind will be directly as the area or superficies of the sail; because the number of particles of the air coming upon it, will always be proportional thereto, and consequently the force with which they strike it. Hence, if A , S , and V represent the area, sine of incidence, and velocity of the wind on one sail; and a , s , and v , those on another: the force compelling the former to turn round, will be to that compelling the latter, as $A \times S^2 \times V^2$ to $a \times s^2 \times v^2$.

When the area of the sail and its position in respect to the wind, continue the same, the force which turns the sail will be as the squares of the velocity; and since the wind scarce ever blows with one uniform velocity, but varies with almost every blast, the force upon the sail will be much more variable and unequal; and therefore the action or working of a wind-mill cannot be so equal, uniform, and steady as that of a water-mill, whose power is always of the same tenor, while the jet of water is so.

If the area of the sail and the velocity of the wind be supposed constant, the force of the wind in the direct position will be to that in the oblique one as GC^2 to GE^2 , as we have before shewn; and it has been also shewn that that part of the force which turns the sail is represented by EF , when GE is the whole force: but $GE:EF (:: GC:CE)$:

$$GE^2: \frac{CE \times GE^2}{GC} = \text{to the force}$$

which turns the sail, when the whole force is represented by GE^2 , as is here the proper expression of it.

This expression $\frac{CE \times GE^2}{GC}$ begins from

nothing, when the angle of incidence begins to be oblique, and increases with the obliquity of the said angle to a certain number of degrees; because that part of the force which is parallel to the axis becomes lesser in proportion to that which is perpendicular to it; but after it has passed this limit, it again decreases, and becomes nothing, when the angle of incidence

dence vanishes; as is easy to understand, by considering that the quantity of wind on the sail does in this case continually decrease.

There is therefore one certain position of the sail, in which the force of the wind is greatest of all upon it, or a maximum; and to find it, put radius $GC = a$, $EC = x$, and we have $GE^2 = aa - xx$, and

consequently the force $\frac{CE \times GE^2}{GC} = \frac{aax - xxx}{a}$, which must be a maximum:

therefore its fluxion $aax - 3xxx = 0$;

whence $aa = 3xx$, and so $x = \sqrt{\frac{1aa}{3}}$ which in logarithms is

$20,000000 - 0,477121$
 $\frac{2}{9,761439}$, which

is the logarithm sine of the angle $35^\circ 16' =$ the angle CGE ; and therefore the angle ECG is equal to $54^\circ 44'$, when the force of the wind is a maximum, as required.

The angle now found, is only that which gives the wind the greatest force to put the sail in motion, but not the angle which gives the force of the wind a maximum upon the sail when in motion. What this angle is, Mr. Mac Laurin has shewn in his book of Fluxions, to which we refer the reader.

Mr. Parent has also shewn, that an elliptic form of the sails is better than the parallelogram, or long square; and that the best position of the sail is not that which is common, *viz.* with its longest side or diameter parallel to the axis of the sail; but, on the contrary, it ought to be perpendicular to it; that is, they ought to be of such a form, and placed in such a manner, as represented *ibid.* n° 5. and after the four sails B, C, D, E, are thus placed on the axis or arm A, they are then to be turned about, and fixed under the proper angle of obliquity abovementioned.

There are three things yet wanting to the perfection of a wind-mill. 1. Some contrivance in the nature of a fly, to regulate the motion of the train, under the irregular and unequal impulse of the wind. 2. Some other contrivance to supply the hopper, or stones, with more or less corn, in proportion to the greater or less strength of the wind. 3. A method of altering the angle of the sail's obliquity, from its maximum of $54^\circ 44'$, at

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the beginning of the motion, to its minimum, when in motion.

WIND, in the menage. A horse that carries in the wind, is one that tosses his nose as high as his ears, and does not carry handsomely. The difference between carrying in the wind, and beating upon the hand, is, that the horse who beats upon the hand, shakes his head, and resists the bridle; but he who carries in the wind, puts up his head without shaking, and only sometimes beats upon the hand. The opposite to carrying in the wind, is arming and carrying low.

WIND-FLOWER, *anemone*, in botany, a genus of the polyandria-polygynia class of plants, the corolla whereof consists of two or three orders of petals, three in each order or series; they are of an oval figure, and erecto-patent: there is no pericarpium; the receptacle is globose or oblong, and attenuated and punctated; the seeds are numerous, acuminate, and have the styles affixed to them.

WIND-GALL, a name given by our farriers to a distemperature of horses. In this case there are bladders full of a corrupt jelly, which, when let out, is thick, and of the colour of the yolk of an egg. They vary in size, but are more usually small than large. Their place is about the fetloc-joint, and they grow indifferently on all four legs, and are often so painful, especially in the summer season, when the weather is hot, and the ground dry and hard, that they make the creature frequently stumble, or even fall down. The general method of cure is to open the swelling, about the length of a bean, and to press out the jelly: when this is done, they apply a mixture of the oil of bays, and the white of an egg, covering it with tow. Another method is, after the jelly is all squeezed out, to wrap round the part a wet woollen-cloth, and then applying a taylor's hot iron, this is to be rubbed over till the moisture is carried away; it is then to be daubed all over with pitch, mastich, and resin, boiled together, laying tow in plenty over all. The wind galls that are situated near the sinews, are much the most painful of all, and soonest make the horse lame.

The general cause of wind-galls is supposed to be extreme work or exercise in hot weather; but it is to be observed, that those horses which have long joints, will be wind-galled if they work never so little. The worst wind-galls are those

of the hinder legs; all the above-mentioned methods will frequently mis of success in these, and nothing but fire will cure them.

WIND-HATCH, in mining, a term used to express the place at which the ore is taken out of the mines.

WIND-SAILS, in a ship, are made of the common sail-cloth, and are usually between twenty-five and thirty feet long, according to the size of the ship, and are of the form of a cone ending obtusely: when they are made use of, they are hoisted by ropes to about two thirds or more of their height, with their basis distended circularly by hoops, and their apex hanging downwards in the hatch-ways of the ship; above each of these, one of the common sails is so disposed, that the greatest part of the air rushing against it, is directed into the wind-sail, and conveyed, as through a funnel, into the upper parts of the body of the ship.

WIND-SHOCK, a name given by our farmers to a distemperature to which fruit-trees, and sometimes timber trees, are subject. Mortimer is of opinion that the wind-shock is a sort of bruise and shiver throughout the whole substance of the tree; but that the bark being often not affected by it, it is not seen on the outside, while the inside is twisted round, and greatly injured. It is by some supposed to be occasioned by high winds; but others attribute it to lightning. Those trees are most usually affected by it, whose boughs grow more out on one side than on the other.

The best way of preventing this in valuable trees, is to take care, in the plantation, that they are sheltered well, and to cut them frequently in a regular manner, while young. The winds not only twist trees in this manner, but they often throw them wholly down: in this case the common method is to cut up the tree for firing, or other uses; but if it be a tree that is worth preserving, and it be not broken, but only torn up by the roots, it may be proper to raise it again, by the following method: let a hole be dug deep enough to receive its roots, in the place where they before were: let the straggling roots be cut off, and some of the branches, and part of the head of the tree; then let it be raised; and when the torn-up roots are replaced in the earth, in their natural situation, let them be well covered, and the hole filled up with rammed earth; the tree will, in this case,

grow as well, and perhaps better, than before. If nature be left to herself, and the tree be not very large, the pulling off the roots will raise it.

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and a quarter long, considerably thick, very much arched and hooked, and pointed at the extremity; the chap is entirely yellow, and has a large protuberance; the legs are very slender and yellow; the thighs are naked half the way up; and the feet are webbed.

WINDERS of wool. See the article **WOOL-WINDERS**.

WINDING STAIRS. See **STAIRS**.

WINDLASS, or **WINDLACE**, a machine used to raise huge weights withal, as guns, stones, anchors, &c. See **MACHINE**.

It is very simple, consisting only of an axis, or roller, supported horizontally at the two ends, by two pieces of wood and a pulley: the two pieces of wood meet at top, being placed diagonally, so as to prop each other; the axis, or roller, goes through the two pieces, and turns in them. The pulley is fastened at top where the pieces join. Lastly, there are two staves or handspikes go through the roller, whereby it is turned, and the rope which comes over the pulley is wound off and on the same.

WINDLASS, in a ship, is an instrument in small ships, placed upon the deck, just abaft the foremast. It is made of a piece of timber six or eight feet square, in form of an axle-tree, whose length is placed horizontally upon two pieces of wood at the ends thereof, and upon which it is turned about by the help of handspikes put into holes made for that purpose. This instrument serves for weighing anchors, or hoisting of any weight, in or out of the ship, and will purchase much more than any capstan, and that without any danger to those that heave; for if in heaving the windlass about, any of the handspikes should happen to break, the windlass would fall of itself.

WINDOW, *q. d.* wind-door, an aperture or open place in the wall of a house, to let in the wind and light. See the article **HOUSE**.

We have various forms of windows, as, arched windows, circular windows, elliptical windows, square and flat windows, round windows, oval windows, gothic windows, regular windows, rustic windows, and sky-lights.

The chief rules in regard to windows, are, 1. That they be as few in number, and as moderate in dimensions, as may consist with other due respects; inasmuch as all openings are weakenings. 2. That they be placed at a convenient distance from the angles, or corners of the build-

ing; because that part ought not to be enfeebled, whose office is to support and fasten all the rest of the building. 3. That care be taken that the windows are all equal one with another, in their rank and order; so that those on the right hand may answer to those on the left, and those above be right over these below; for this situation of windows will not only be handsome and uniform, but also the void being upon the void, and the full upon the full, it will be a great strengthening to the whole fabric.

As to their dimensions, care is to be taken not to give them more or less light than is needful; that is, to make them no bigger, nor less, than is convenient; therefore, regard is to be had to the bigness of the rooms which are to receive the light: it is evident, that a great room needs more light, and, consequently, a greater window than a little room, and *à contra*. The apertures of windows, in middle-sized houses, may be four and a half, or five feet, between the jaumbs, and in greater buildings six and a half, or seven feet, and their height may be double their length at the least. But in high rooms, or larger buildings, their height may be a third, a fourth, or half a breadth more than double their length. These are the proportions of the windows for the first story; and according to these must the upper stories be for breadth; but, as for height, they must diminish: the second story may be one-third part lower than the first, and the third one-fourth part lower than the second. See the article **BUILDING**.

For architrave windows, dormer windows, transom windows, see the articles **ARCHITRAVE**, **DORMER**, &c.

For the scenography of windows, see the article **SCENOGRAPHY**.

WINDSOR, a borough-town of Berkshire, twenty miles west of London, most remarkable for the magnificent palace or castle situated there on an eminence, which commands the adjacent country for many miles, the river Thames running at the foot of the hill. The knights of the garter are installed in the royal chapel here.

It sends two members to parliament.

WINDY TUMOURS. See **TUMOUR**.

WINE, *vinum*, a brisk, agreeable, spirituous and cordial liquor, drawn from vegetable bodies and fermented. See the articles **VEGETABLE** and **FERMEN-**

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This bird is of the size of our widgeon, and at a distance appears to be all over white; the head is remarkably large, and rounded; the ears are large, as also are the eyes, the iris of which is of a beautiful gold yellow, and the pupil black as jet; the beak is about an inch and

and a quarter long, considerably thick, very much arched and hooked, and pointed at the extremity; the chap is entirely yellow, and has a large protuberance; the legs are very slender and yellow; the thighs are naked half the way up; and the feet are webbed.

WINDERS of wool. See the article **WOOL-WINDERS**.

WINDING STAIRS. See **STAIRS**.

WINDLASS, or **WINDLACE**, a machine used to raise huge weights withal, as guns, stones, anchors, &c. See **MACHINE**.

It is very simple, consisting only of an axis, or roller, supported horizontally at the two ends, by two pieces of wood and a pulley: the two pieces of wood meet at top, being placed diagonally, so as to prop each other; the axis, or roller, goes through the two pieces, and turns in them. The pulley is fastened at top where the pieces join. Lastly, there are two staves or handspikes go through the roller, whereby it is turned, and the rope which comes over the pulley is wound off and on the same.

WINDLASS, in a ship, is an instrument in small ships, placed upon the deck, just abaft the foremast. It is made of a piece of timber six or eight feet square, in form of an axle-tree, whose length is placed horizontally upon two pieces of wood at the ends thereof, and upon which it is turned about by the help of handspikes put into holes made for that purpose. This instrument serves for weighing anchors, or hoisting of any weight, in or out of the ship, and will purchase much more than any capstan, and that without any danger to those that heave; for if in heaving the windlass about, any of the handspikes should happen to break, the windlass would fall of itself.

WINDOW, *q. d.* wind-door, an aperture or open place in the wall of a house, to let in the wind and light. See the article **HOUSE**.

We have various forms of windows, as, arched windows, circular windows, elliptical windows, square and flat windows, round windows, oval windows, gothic windows, regular windows, rustic windows, and sky-lights.

The chief rules in regard to windows, are, 1. That they be as few in number, and as moderate in dimensions, as may consist with other due respects; inasmuch as all openings are weakenings. 2. That they be placed at a convenient distance from the angles, or corners of the build-

ing; because that part ought not to be enfeebled, whose office is to support and fasten all the rest of the building. 3. That care be taken that the windows are all equal one with another, in their rank and order; so that those on the right hand may answer to those on the left, and those above be right over these below; for this situation of windows will not only be handsome and uniform, but also the void being upon the void, and the full upon the full, it will be a great strengthening to the whole fabric.

As to their dimensions, care is to be taken not to give them more or less light than is needful; that is, to make them no bigger, nor less, than is convenient; therefore, regard is to be had to the bigness of the rooms which are to receive the light: it is evident, that a great room needs more light, and, consequently, a greater window than a little room, and *à contra*. The apertures of windows, in middle-sized houses, may be four and a half, or five feet, between the jaumbs, and in greater buildings six and a half, or seven feet, and their height may be double their length at the least. But in high rooms, or larger buildings, their height may be a third, a fourth, or half a breadth more than double their length. These are the proportions of the windows for the first story; and according to these must the upper stories be for breadth; but, as for height, they must diminish: the second story may be one-third part lower than the first, and the third one-fourth part lower than the second. See the article **BUILDING**.

For architrave windows, dormer windows, transom windows, see the articles **ARCHITRAVE**, **DORMER**, &c.

For the scenography of windows, see the article **SCENOGRAPHY**.

WINDSOR, a borough-town of Berkshire, twenty miles west of London, most remarkable for the magnificent palace or castle situated there on an eminence, which commands the adjacent country for many miles, the river Thames running at the foot of the hill. The knights of the garter are installed in the royal chapel here.

It sends two members to parliament.

WINDY TUMOURS. See **TUMOUR**.

WINE, *vinum*, a brisk, agreeable, spirituous and cordial liquor, drawn from vegetable bodies and fermented. See the articles **VEGETABLE** and **FERMEN-**

TATION.

The

The character of a wine, according to Boerhaave, is, that the first thing it affords by distillation, be a thin, oily, inflammable fluid called a spirit. See the article SPIRIT.

This distinguishes wines from another class of fermented vegetable juices, viz. vinegar, which instead of such spirit, yields, for the first thing, an acid un-inflammable matter. See VINEGAR.

All sorts of vegetables, fruits, seeds, roots, &c. afford wine; as grapes, currants, mulberries, elder-berries, cherries, apples, pulse, beans, pease, turneps, radishes, and even grass itself. Hence under the class of wines, or vinous liquors, come not only wines absolutely so called, but also ale, cyder, &c. See VINOUS, MALT-LIQUOR, ALE, CYDER, &c.

WINE is, in a more peculiar manner, appropriated to that which is drawn from the fruit of the vine, by stamping its grapes in a vat, or crushing and expressing the juice out of them in a press, and then fermenting, &c. See WINE, VINEYARD, GRAPE, PRESS, &c.

The goodness of wine consists in its being neat, dry, fine, bright, and brisk, without any taste of the soil, of a clean fleshy colour, having a strength without being heady, a body without being sour, and keeping without growing hard or eager. The difference of flavour, taste, colour, and body, in wines, is, perhaps, as much owing to the different manner and time of pressing, gathering, fermenting, &c. the grape, as to any difference of the grape itself. In Hungary, whence tockay and some of the richest and highest flavoured wines come, they are extremely curious in these respects: for their prime and most delicate wines, the grape is suffered to continue upon the vine, till it is half dried by the heat of the sun; and, if the sun's heat should not prove sufficient, they are dried by the gentle heat of a furnace, and then picked one by one from the stalks; the juice of this grape, when pressed out, is of a fine flavour, and sweet as sugar: this, after due fermentation, is kept for a year, and then racked from the lees, when it proves a generous, oily, rich wine, and is sold at a very high rate. The Hungarians prepare a second sort of wine, by collecting together the better kind of grapes, carefully picking the fruit from the stalks, and then pressing out the juice: this is extremely sweet, and is made richer by infusing in it, after it has fermented for

some days, a sufficient quantity of half dried grapes. This wine is very sweet, oily, of a grateful taste, and retains these qualities for a long time. There is a third sort made from the pure juice of the same kind of grape, without any addition. This is a more brisk and lively wine, and far less sweet. They likewise prepare a fourth sort, from grapes of different goodness mixed together; this, though not so generous, is nevertheless an excellent wine. These hungarian wines are remarkable for preserving their sweetness, and for the delicacy of their taste and smell; they, likewise, do not grow easily vapid, and may be kept in perfection for many years.

Wine being a liquor mostly of foreign produce, the divers names, forms, kinds, distinctions, &c. thereof, are borrowed from the countries where it is produced; the principal whereof, at this day, is France, to wines of which country, a good part of what we have to say of this noble liquor, will more immediately belong.

Wine in France is distinguished from the several degrees and steps of its preparation, into, 1. *Mere goutte*, mother drop, which is the virgin wine, or that which runs of itself out at the top of the vat wherein the grapes are laid, before the vintager enters to tread or stamp the grapes. 2. Must, furmust, or itum, which is the wine or liquor in the vat, after the grapes have been trod or stamped. 3. Pressed wine, being that squeezed with a press out of the grapes half bruised by the treading. The husks left of the grapes are called rope, murk, or mark, by throwing water upon which, and pressing them afresh, they make a liquor for servants use, answerable to our cyderkin, and called *boisson*, which is of some use in medicine, in the cure of disorders occasioned by viscid humours. 4. Sweet wine, is that which has not yet worked nor fermented. 5. Bourn, that which has been prevented working by casting in cold water. 6. Worked wine, that which has been let work in the vat, to give it a colour. 7. Boiled wine, that which has had a boiling before it worked, and which by that means still retains its native sweetness. 8. Strained wine, that made by steeping dry grapes in water, and letting it ferment of itself. Wines are also distinguished with regard to their colour into white wine, red wine, claret wine, pale wine, rose, or black wine; and

and with regard to their country, or the soil that produces them into french wines, spanish wines, rhenish wines, hungary wines, greek wines, canary wines, &c. and more particularly into port wine, madeira wine, burgundy wine, champain wine, falernian wine, tockay wine, schiras wine, &c.

Method of making, fining, &c. WINE. In the southern parts of France, their way is with red wines to tread or squeeze the grapes between the hands, and to let the whole stand, juice and husks, till the tincture be to their liking; after which they press it. But for white wines, they press the grapes immediately; when pressed, they tun the must and stop up the vessel, only leaving the depth of a foot or more to give room for it to work. At the end of ten days they fill this space with some other proper wine, that will not provoke it to work again. This they repeat from time to time, new wine spending itself a little before it comes to perfection. The usual method of fining down wines, so as to render them expeditiously bright, clear, and fit for use, is this. Take an ounce of isinglass, beat it into thin threads with a hammer, and dissolve it, by boiling, in a pint of water; this, when cold, becomes a stiff jelly. Whisk up some of this jelly into a froth with a little of the wine intended to be fined, then stir it well among the rest in the cask, and bung it down tight; by this means the wine will become bright in eight or ten days. This method, however, is found to be best suited to the white wines; for the red ones, the wine-coopers commonly use the whites of eggs beat up to a froth, and mixed in the same manner with their wines.

They fine it down also by putting the shavings of green beech into the vessel, having first taken off all the rind, and boiled them an hour in water to extract their rankness, and afterwards dried them in the sun, or in an oven. A bushel of these serve for a tun of wine: and being mashed, they serve again and again, till almost quite consumed.

For english wine, the method recommended by Mortimer, is first to gather the grapes when very dry, to pick them from the stalks, then to press them, and let the juice stand twenty-four hours in a vat covered. Afterwards to draw it off from the gross lees, and then put it up in a cask, and to add a pint or quart of strong red or white port to every gallon

of juice, and let the whole work, bunning it up close, and letting it stand till January; then bottle it in dry weather. Bradley chuses to have the liquor, when pressed, stand with the husks, stalks, and all in the vat, to ferment for fifteen days. The method of converting white-wine into red, so much practised by the modern wine coopers, Dr. Shaw observes, is this. Put four ounces of turnsole rags into an earthen vessel, and pour upon them a pint of boiling water; cover the vessel close, and leave it to cool; strain off the liquor, which will be of a fine deep red, inclining to purple. A small portion of this colours a large quantity of wine. This tincture might be either made in brandy, or mixed with it, or else made into a syrup, with sugar, for keeping. A common way with the wine-coopers is to infuse the rags cold in wine for a night or more, and then wring them out with their hands; but the inconvenience of this method is, that it gives the wine a disagreeable taste; or what is commonly called the taste of the rag; whence the wines, thus coloured, usually pass among judges for pressed wines, which have all this taste from the canvas rags in which the lees are pressed. The way of extracting the tincture, as here directed, is not attended with this inconvenience; but it loads the wine with water; and if made into a syrup, or mixed in brandy, it would load the wine with things not wanted, since the colour alone is required. Hence the colouring of wines has always its inconveniences. In those countries which do not produce the tinging grape, which affords a blood-red juice, wherewith the wines of France are often stained, in defect of this, the juice of elder-berries is used, and sometimes logwood is used at Oporto.

The colour afforded by the method here proposed, gives wine the tinge of the Bourdeaux-red, not the port; whence the foreign coopers are often distressed for want of a proper colouring for red wines in bad years. This might, perhaps, be supplied by an extract made by boiling stick-lack in water. The skins of tinging grapes might also be used, and the matter of the turnsole procured in a solid form, not inhibited in rags.

Stahl observes, that it is a common accident, and a disease in wines, to be kept too hot; which is not easy to cure when it has been of any long continuance, otherwise it may be cured by introducing
a small

a small artificial fermentation, that new ranges the parts of the wine, or rather recovers their former texture: but the actual exposing of wine to the fire, or the sun, presently disposes it to turn eager; and the making it boiling hot, is one of the quickest ways of expediting the process of making of vinegar.

On the other hand, wine kept in a cool vault, and well secured from the external air, will preserve its texture entire in all the constituent parts, and sufficiently strong for many years, as appears not only from old wines, but other foreign fermented liquors, particularly those of China, prepared from a decoction of rice, which being well closed down in a vessel, and buried deep under ground, will continue, for a long series of years, rich, generous, and good, as the histories of that country universally agree in assuring us.

The most general remedy hitherto known for all the diseases of wines, is a prudent use of tartarized spirit of wine, which not only enriches, but disposes all ordinary wines to grow fine.

If either by fraud or accident a larger portion of water is mixed with wine than is proper for its consistence, and no way necessary or essential, this superfluous water does not only deprave the taste, and spoil the excellence of the wine, but also renders it less durable; for humidity in general, and much more a superfluous aqueous humidity, is the primary and restless instrument of all the changes that are brought on by fermentation. It may doubtless, therefore, be useful, and sometimes absolutely necessary, to take away this superfluous water from the other part which strictly and properly constitutes the wine. This has been agreed upon on all hands as a thing proper; but the manner of doing it has not been well agreed on; some have proposed the effecting it by means of heat and evaporation, others by percolation, and others by various other methods, all found unsuccessful when brought to the trial; but the way proposed by Dr. Shaw from Stahl, is the most certain and commodious; this is done by a concentration of the wine, not by means of heat, but of cold.

If any kind of wine, but particularly such as has never been adulterated, be in a sufficient quantity, as that of a gallon or more, exposed to a sufficient degree

of cold in frosty weather, or be put into any place where ice continues all the year, as in our ice-houses, and there suffered to freeze, the superfluous water that was originally contained in the wine, will be frozen into ice, and will leave the proper and truly essential part of the wine unfrozen, unless the degree of cold should be very intense, or the wine but weak and poor. This is the principle on which Stahl founds his whole system of condensing wines by cold. When the frost is moderate, the experiment has no difficulty, because not above a third or a fourth part of the superfluous water will be froze in a whole night; but if the cold be very intense, the best way is, at the end of a few hours, when a tolerable quantity of ice is formed, to pour out the remaining fluid liquor, and set it in another vessel to freeze again by itself. If the vessel, that thus by degrees receives the several parcels of the condensed wine, be suffered to stand in the cold freezing place, where the operation is performed, the quantity lying thin in the pouring out, or otherwise, will be very apt to freeze anew; and if it be set in a warm place, some of this aqueous part thaws again, and so weakens the rest. The condensed wine, therefore, should be emptied in some place of a moderate degree as to cold or heat, where neither the ice may dissolve, nor the viscid substance mixed among it be congealed. But the best expedient of all is to perform the operation with a large quantity of wine, or that of several gallons, where the utmost exactness, or the danger of a trifling waste, need not be regarded.

By this method, when properly performed, there first freezes about one third part of the whole liquor; and this is properly the more purely aqueous part of it, inasmuch that when all the vinous fluid is poured off, to be again exposed to a concentration, the ice remaining behind, from this first freezing, being set to thaw in a warm place, dissolves into a pure and tasteless water. The frozen part, or ice, consists only of the watery part of the wine, and may be thrown away, and the liquid part retains all the strength, and is to be preserved. This will never grow sour, musty, or mouldy afterwards, and may at any time be reduced to wine of the common kind again, by adding to it as much water as will make it up to the quantity that it was before.

Wines in general may by this method be reduced to any degree of vinosity or perfection.

The benefit and advantage of this method of congelation, if reduced to practice in the large way, in the wine countries, must be evident to every body. Concentrated wines, in this manner, might be sent into foreign countries, instead of wine and water, which is what is usually now sent, the wines they export being loaded, and in danger of being spoiled by three or four times their own quantity of unnecessary, superfluous, and prejudicial water.

An easy method of recovering pricked wines, may be learned from the following experiment: take a bottle of red port that is pricked, add to it half an ounce of tartarized spirit of wine, shake the liquor well together, and set it by for a few days, and it will be found very remarkably altered for the better.

This experiment depends upon the useful doctrine of acids and alkalies. All perfect wines have naturally some acidity, and when this acidity prevails too much, the wine is said to be pricked, which is truly a state of the wine tending to vinegar: but the introduction of a fine alkaline salt, such as that of tartar, imbibed by spirit of wine, has a direct power of taking off the acidity, and the spirit of wine also contributes to this, as a great preservative in general of wines. If this operation be dexterously performed, pricked wines may be absolutely recovered by it, and remain saleable for some time: and the same method may be used to malt liquors just turned sour.

The age of wine is properly reckoned by leaves; thus they say wine of two, four, or six leaves, to signify wine of two, four, or six years old; taking each new leaf put forth by the vine, since the wine was made, for a year.

The net duties to be paid on importation of all wines into the port of London, and repaid on exportation, are as follows.

Wines imported by British for sale. Rhenish, german, or hungary wines, the ton, filled in casks, pay, on importation, 35 l. 2 s. $\frac{7}{10}$ d. and, on exportation, draw back 26 l. 13 s. $8\frac{8}{10}$ d. in bottles, on importation, 35 l. 15 s. $3\frac{1}{10}$ d. and draw back, on exportation, 27 l. 5 s. $4\frac{8}{10}$ d. Portugal or madeira wine, the ton filled in casks, pays, on importation, 28 l. 8 s. $3\frac{1}{10}$ d. and, on exportation,

draws back 20 l. 6 s. $4\frac{8}{10}$ d. in bottles, on importation, 31 l. 5 s. $3\frac{1}{10}$ d. and, on exportation, draws back 22 l. 15 s. $4\frac{8}{10}$ d. French wine, the ton filled in cask, on importation, pays 60 l. 16 s. $4\frac{8}{10}$ d. and, on exportation, draws back, 26 l. 2 s. $11\frac{1}{10}$ d. in bottles, on importation, 64 l. 5 s. $4\frac{8}{10}$ d. and, on exportation, draws back 27 l. 18 s. $8\frac{7}{10}$ d. Levant and all other wines, the ton filled in casks pay, on importation, 29 l. 4 s. $9\frac{1}{10}$ d. and, on exportation, draws back 21 l. 2 s. $10\frac{8}{10}$ d. in bottles, on importation, pays 32 l. 3 s. $9\frac{1}{10}$ d. and, on exportation, draws back, 23 l. 13 s. $10\frac{8}{10}$ d. Wines imported by British for private use. Rhenish, german, or hungary wine, the ton filled in casks, pays, on importation, 36 l. $3\frac{6}{10}$ d. and, on exportation, draws back 27 l. 5 s. $10\frac{8}{10}$ d. in bottles, on importation, the ton pays 36 l. 13 s. 6 d. and, on exportation, draws back 27 l. 17 s. 6 d. Portugal or madeira wine, the ton filled in casks, on importation, pays 29 l. 6 s. 6 d. and, on exportation, draws back 20 l. 18 s. 6 d. in bottles, on importation, 32 l. 3 s. 6 d. and, on exportation, draws back 23 l. 7 s. 6 d. French wine, the ton filled in casks, pays, on importation, 61 l. 8 s. 6 d. and, on exportation, draws back 26 l. 11 s. $\frac{4}{10}$ d. in bottles, on importation, 64 l. 17 s. 6 d. and, on exportation, draws back 28 l. 6 s. 10 d. Levant and all other wines, the ton filled in casks, pays, on importation, 30 l. 3 s. and, on exportation, draws back 21 l. 15 s. in bottles, on importation, 33 l. 2 s. and, on exportation, draws back 24 l. 6 s. And besides the afore-mentioned duties, all wines imported into the port of London, are to pay to the use of the orphans of the said city, for every ton, 4 s.

Wines imported by foreigners are to pay, besides the afore said duties, the under-mentioned, which must be added respectively to the duties payable by British. Rhenish, german or hungary wines, the ton filled in casks, on importation, pays 4 l. 8 s. $2\frac{4}{10}$ d. and, on exportation, draws back 4 l. 3 s. $2\frac{4}{10}$ d. in bottles, on importation, 4 l. 10 s. and, on exportation, draws back 4 l. 5 s. French wine, the ton in casks, pays, on importation, 4 l. 4 s. $7\frac{2}{10}$ d. and, on exportation, draws back 3 l. 19 s. $7\frac{5}{10}$ d. in bottles, on importation, 4 l. 10 s. and, on exportation, draws back 4 l. 5 s. Le-

vant

Lunenburg, situated at the confluence of the river Elbe and Ilmenau, fifteen miles north-west of Lunenburg.

WINSLOW, a market-town of Bucks, six miles north of Ailesbury.

WINSTER, a market-town of Darbyshire, situated ten miles north of Darby.

WINTER, one of the four seasons or quarters of the year. See *SEASON*, &c.

Winter commences on the day when the sun's distance from the zenith of the place is greatest, and ends on the day when its distance is at a mean between the greatest and least. See the articles *SUN* and *EARTH*.

Notwithstanding the coldness of the season, it is proved by astronomers, that the sun is really nearer the earth in winter than in summer; the reason of the decay of heat, and the truth of this proposition, see explained under the articles *HEAT*, *LIGHT*, *EARTH*, &c.

Under the equator, the winter as well as other seasons, return twice every year; but all other places have only one winter in the year, which in the northern hemisphere begins when the sun is in the tropic of capricorn, and in the southern hemisphere when in the tropic of cancer; so that all places in the same hemisphere have their winter at the same time. See the article *TROPIC*.

WINTER, among printers, that part of the printing-press serving to sustain the carriage. See *PRINTING-PRESS*.

WINTER'S BARK, *cortex winteranus*, in botany, a name given to the bark of the white or wild cinnamon tree. See the article *CINNAMON*.

The winter's bark is a thick and firm bark, though we have a different thing sometimes under its name: it comes to us rolled up in the manner of the common cinnamon, into a kind of tubes or pipes; but they are usually thicker, and always shorter than the fine tubes of cinnamon. It is externally of a greyish colour, and of a reddish brown within; it is properly, indeed, a double bark, the outer and inner of the same tree, not the inner bark alone, separated from the other, as the cinnamon and cassia are. The outer rind is of an uneven surface and of a loose texture, very brittle and easily powdered. The inner bark, which has the principal virtue, is hard, and of a dusky reddish brown. The outer one is often cracked and open in several places, the inner one never in any. It is of an

extremely fragrant and aromatic smell, and of a sharp, pungent, and aromatic taste, much hotter than cinnamon in the mouth, and leaving a more lasting flavour in it.

It is to be chosen in pieces not too large, with the inner or brown part sound and firm, and of a very sharp taste. It is apt to be worm eaten; but in that case it is wholly to be rejected, as having lost the far greater part of its virtue.

The cortex winteranus was wholly unknown to the ancients; the discovery of it among us is owing to captain Winter, who, in the year 1567, going as far as the streights of Magellan with Sir Francis Drake, found this bark on that coast, and bringing a large quantity of it with him in his return to England, it became used in medicine, and was ever after called by his name. It is not, however, peculiar to the place he found it in, but is frequent in many parts of America.

The virtues of this bark were discovered by the english sailors on board captain Winter's ship; they first used it by way of spice to their foods, and afterwards for the scurvy. It is also good in palsies and rheumatisms; and a decoction of the leaves is good by way of fomentation, for the parts externally affected by the scurvy. The english sailors made it famous for its virtues against the poison of a certain fish, common about the Magellanic sea, and which they called the sea-lion. They ate the flesh of this fish, and fell into many illnesses by it, among which was one attended with a peeling off the skin of their whole bodies, not without excessive pain; this they remedied by the cortex winteranus; but by the accounts we have of the effects of eating this fish, as it is called, they were rather symptoms of an inveterate scurvy, and, therefore, it is no wonder this bark did them great service.

WINTER-QUARTERS. See *QUARTERS*.

WINTER-RIG, among husbandmen, signifies to fallow or till the land in winter. See the article *FALLOW*.

WINTER-SOLSTICE. See *SOLSTICE*.

WINTERTONNESSE, the north cape of the county of Norfolk, four miles north of Yarmouth.

WINTSHEIM, a town of Germany, in the circle of Franconia, and marquissate of Anspach, situated fifteen miles north of Anspach.

WIRE, **WIAR**, **WIER**, **WYRE**, a piece of

of metal drawn through the hole of an iron into a thread of a fineness answerable to the hole it passed through.

Wires are frequently drawn so fine, as to be wrought along with other threads of silk, wool, flax, &c.

The metals most commonly drawn into wire, are gold, silver, copper, and iron. Gold wire is made of cylindrical ingots of silver, covered over with a skin of gold, and thus drawn successively through a vast number of holes, each smaller and smaller; till at last it is brought to a fineness exceeding that of a hair. That admirable ductility which makes one of the distinguishing characters of gold, is no where more conspicuous, than in this gilt wire. A cylinder of forty-eight ounces of silver, covered with a coat of gold, only weighing one ounce, as Dr. Halley informs us, is usually drawn into a wire, two yards of which weigh no more than one grain; whence ninety-eight yards of the wire weigh no more than forty-nine grains, and one single grain of gold covers the ninety-eight yards; so that the ten thousandth part of a grain is above one-eighth of an inch long. The same author computing the thickness of the skin of gold, found it to be $\frac{1}{134300}$ part of an inch. Yet so perfectly does it cover the silver, that even a microscope does not discover any appearance of the silver underneath. M. Rohault likewise observes, that a like cylinder of silver, covered with gold, two feet eight inches long, and two inches nine lines in circumference, is drawn into a wire 307200 feet long, *i. e.* into 115200 times its former length. Mr. Boyle relates, that eight grains of gold, covering a cylinder of silver, is commonly drawn into a wire 13000 feet long. See the articles GOLD and DUCTILITY.

Silver-wire is the same with gold-wire, except that the latter is gilt, or covered with gold, and the other is not.

There are also counterfeit gold and silver-wires; the first made of a cylinder of copper silvered over, and then covered with gold; and the second of a like cylinder of copper, silvered over, and drawn through the iron, after the same manner as gold and silver-wire.

Brass-wire is drawn after the same manner as the former. Of this there are divers sizes, suited to the different kinds of works. The finest is used for the strings of musical instruments, as spinets, harpsi-

chords, manichords, &c. See the article SPINET, &c.

The pin-makers, likewise, use vast quantities of brass-wire, to make their pins of. Iron-wire is drawn of various sizes, from half an inch to one tenth of an inch diameter.

The first iron that runs from the stone, when melting, being the softest and toughest, is preserved to make wire of. Iron-wire is made from small bars of iron called *esleom-iron*, which are first drawn out to a greater length, and to about the thickness of one's little finger, at a furnace, with a hammer gently moved by water. These thinner pieces are bored round, and put into a furnace to aneal for twelve hours. A pretty strong fire is used for this operation. After this they are laid under water for three or four months, the longer the better; then they are delivered to the workmen, called *rippers*, who draw them into wire thro' two or three holes. After this they aneal them again for six hours, and water them a second time for about a week, and they are then delivered again to the *rippers*, who draw them into wire of the thickness of a large packthread. They are then anealed a third time, and then watered for a week longer, and delivered to the small wire-drawers, called *over-house-men*.

In the mill where this work is performed, there are several barrels hooped with iron, which have two hoops on their upper sides, on each whereof hang two links which stand across, and are fastened to the two ends of the tongs, which catch hold of the wire, and draw it through the hole. The axis on which the barrel moves does not run through the center, but is placed on one side, which is that on which the hooks are placed; and underneath there is fastened to the barrel a spoke of wood, which they call a *swingle*, which is drawn back a good way by the cogs in the axis of the wheel, and draws back the barrel, which falls to again by its own weight. The tongs hanging on the hooks of the barrel, are by the workmen fastened to the end of the wire, and by the force of the wheel, the hooks being pulled back, draw the wire through the holes. The plate in which the holes are, is iron on the outside, and steel on the inside; and the wire is anointed with train-oil, to make it run the easier.

WIRE of Lapland. The inhabitants of Lapland have a sort of shining slender substance in use among them on several occasions, which is much of the thickness and appearance of our silver-wire, and is therefore called, by those who do not examine its structure or substance, lapland-wire. It is made of the sinews of the rein-deer, which being carefully separated in the eating, are, by the women, after soaking in water, and beating, spun into a sort of thread, of admirable fineness, and strength, when wrought to the smallest filaments; but when larger, is very strong, and fit for the purposes of strength and force. Their wire, as it is called, is made of the finest of these threads, covered with tin. The women do this business, and the way they take is to melt a piece of tin, and placing at the edge of it a horn with a hole through it, they draw these sinewy threads, covered with the tin, through the hole, which prevents their coming out too thick covered. This drawing is performed with their teeth; and there is a small piece of bone placed at the top of the hole, where the wire is made flat, so that we always find it rounded on all sides but one, where it is flat.

This wire they use in embroidering their cloaths as we do gold and silver; they often sell it to strangers, under the notion of its having certain magical virtues.

WIRKSWORTH, a market-town of Derbyshire, situated six miles north of Darby.

WISBEACH, a market-town of the isle of Ely, in Cambridgeshire, situated fifteen miles north of Ely.

WISLEY, a port-town of Sweden, situated on the west coast of the island of Gothland, one hundred and ten miles south of Stockholm.

WISDOM, *sapientia*, usually denotes a higher and more refined notion of things immediately presented to the mind, as it were, by intuition, without the assistance of ratiocination. See **UNDERSTANDING**, **REASON**, **KNOWLEDGE**, &c.

In this sense wisdom may be said to be a faculty of the mind, or at least a modification and habit thereof. See **FACULTY**, **MODIFICATION**, **HABIT**, &c.

Sometimes the word is more immediately used, in a moral sense, for what we call prudence, or discretion, which consists in the soundness of the judgment, and a conduct answerable thereto.

WISMAR, a town of Germany, in the circle of lower Saxony, and dutchy of Mecklenburg, situated on a bay of the Baltic-sea, twelve miles north of Swerin.

WISSELOCK, a town of Germany, in the palatinate of the Rhine, situated seven miles south of Heidelberg.

WISTON, a market-town of Pembroke-shire, situated ten miles north of Pembroke.

WIT, a faculty of the mind, consisting, according to Mr. Locke, in the assembling and putting together of those ideas, with quickness and variety, in which any resemblance or congruity can be found, in order to form pleasant pictures and agreeable visions to the fancy. This faculty, the same author observes, is just the contrary of judgment, which consists in the separating carefully from one another, such ideas wherein can be found the least difference, thereby to avoid being misled by similitude and affinity, to take one thing for another. It is the metaphor and allusion, wherein, for the most part, lies the entertainment and pleasantry of wit, which strikes so lively on the fancy, and is therefore so acceptable to all people, because its beauty appears at first sight, and there is required no labour of thought to examine what truth or reason there is in it. The mind without looking any farther, rests satisfied with the agreeableness of the picture, and the gaiety of the imagination; and it is a kind of affront to go about to examine it by the severe rules of truth or reason. See the article **IMAGINATION**, &c.

Wit is also an appellation given to the person possessed of this faculty; and here the true wit must have a quick succession of pertinent ideas, and the ability of arranging and expressing them in a lively and entertaining manner; he must at the same time have a great deal of energy and delicacy in his sentiments; his imagination must be sprightly and agreeable, without any thing of parade or vanity in his discourse: but it is not, however, essential to the character of a wit, to be ever hunting after the brilliant, studying sprightly turns, and affecting to say nothing but what may strike and surprise. See the article **FACULTY**, &c.

WITCHCRAFT, a kind of sorcery, especially in women, in which it is ridiculously supposed that an old woman, by entering into a contract with the devil, is enabled, in many instances, to change the

the course of nature; to raise winds; perform actions that require more than human strength; and to afflict those who offend them with the sharpest pains, &c. In the times of ignorance and superstition, many severe laws were made against witches, by which great numbers of innocent persons, distressed with poverty and age, were brought to a violent death; but these are now happily repealed.

WITENA-MOT, or **WITENA-GEMOT**, among our saxon ancestors, was a term which literally signified the assembly of the wise men, and was applied to the great council of the nation, of latter days called the parliament.

WITEPSKI, the capital of the palatinate of the same name, in the duchy of Lithuania, in Poland: east long. 30°, north lat. 56°.

WITHAM, a market-town of Essex, ten miles north-east of Chelmsford.

WITHERNAM, in law, a writ that lies where a distress is driven out of the county, and the sheriff cannot make deliverance to the party distrained; in that case this writ is directed to the sheriff, commanding him to take as many of the beasts, or goods, of the party into his keeping till he make deliverance of the first distress.

WITHERS of a horse, the juncture of the shoulder-bones at the bottom of the neck and main, towards the upper part of the shoulder.

WITNESS, in law, a person who gives evidence in any cause, and is sworn to speak the truth, the whole truth, and nothing but the truth.

A witness ought to be indifferent with respect to each party; for if he will be a gainer or loser by the suit, he is not sworn as a witness. See **EVIDENCE**.

False witnesses, suborners of witnesses, &c. are in England punished with the pillory; in several other countries with death. See the articles **PERJURY**, **SUBORDINATION**, &c.

WITNEY, a market-town of Oxfordshire, seven miles west of Oxford. Here is the greatest manufacture of blankets in England.

WITTENBURG, a city of Germany, in the circle of Upper Saxony, fifty miles north of Dresden.

WITTENBURG, is also a town of Germany, in the marquisate of Brandenburg, sixty miles north of the city of Brandenburg.

WITTLESEYMERE, a lake in the Isle

of Ely, on the confines of Huntingdonshire, six miles long and three broad.

WITTIMUND, a town of Germany, in the circle of Westphalia, fifteen miles north of Embden.

WIVELSCOMB, a market-town of Somersetshire, situated twenty-seven miles south-west of Wells.

WOAD, *isatis*, in botany. See **ISATIS**.

This is a drug used by the dyers to give a blue colour. It arises from seed sown annually in the spring, which puts forth leaves resembling those of rib-wort plantain. These plants have usually three, four, or five crops of leaves every year, of which the first is the best, and the rest in their order. When the leaves are ripe, they gather them, and carry them to a woad mill to grind them small; after which they are laid eight or ten days on heaps, and are at length made into a kind of balls, which are laid in the shade on hurdles to dry. This done, they break or grind them to powder; which is then spread on a floor and watered. Here they let it smok and heat, till by torrifying it every day it becomes quite dry.

A woad-blue is a very deep blue, almost black; and is the bale of so many sorts of colours, that the dyers have a scale by which they compose the several casts or degrees of woad, from the brightest to the deepest.

WOBN, a market-town of Bedfordshire, ten miles south of Bedford.

WOERDEN, a town of the United Provinces, in the province of Holland, eighteen miles south of Amsterdam.

WOLAW, the capital of a duchy of the same name, in Bohemia: east long. 16° 38', north lat. 51° 22'.

WOLD, signifies a plain down, or open champaign ground, hilly and void of wood.

WOLD, or **WELD**, among dyers. See the article **WELD**.

WOLF, *lupus*, in zoology, the canis, with the tail bending inward. See **CANIS**.

The wolf is a very large and a very fierce animal, being equal to the biggest mastiff in size, and having much of the general appearance of that creature: the head is large and fleshy; the eyes are large and prominent, and their iris hazel: the ears are short, patulous, and erect: the teeth are very large, and the animal has a way of shewing them in a frightful manner, by grinning: the neck

is robust and thick: the body is large, and the back broad: the legs are very robust: the tail is long and bushy: the natural colour is black, but there are some tawny; and in some places they are in winter perfectly white. The wolf is a very mischievous creature, destroying cattle; and in hard winters attacking houses and villages in whole troops.

Sea-WOLF, in ichthyology. See the article LUPUS.

WOLFENBUTTEL, a city of Germany, in the circle of lower Saxony, and dutchy of Brunswick: east long $10^{\circ} 32'$, north lat. $52^{\circ} 20'$.

WOLFERDYKE, an island of the united Netherlands, in the province of Zealand, situated between the islands of north Beveland and south Beveland.

WOLFESHEAD, or **WOLFERHEFOD**, denoted the condition of such persons as were outlawed in the time of the Saxons; who, if they could not be taken alive, so as to be brought to justice, might be slain, and their heads brought to the king; for the head of one of these was no more accounted of than a wolf's head. See the article OUTLAWRY.

WOLGA, a large river of Russia, which rising in the north of that empire, runs south-east till it falls into the Caspian-sea, about fifty miles below Astracan, after its having run a course of between two and three thousand miles.

WOLGAST, a city and port-town of Germany, in the circle of Upper Saxony, and dutchy of Pomerania, subject to Sweden: east long. $14^{\circ} 5'$, north lat. $54^{\circ} 12'$.

WOLKOWSKA, a city of Poland, in the dutchy of Lithuania, and palatinate of Novogrodeck: east long. 24° , north lat. 53° .

WOLLIN, a town and island of Pomerania, situated in the Baltic-sea, at the mouth of the river Oder, subject to the king of Prussia.

WOLODOMIR, the capital of a province of the same name in Russia: east long. $30^{\circ} 5'$, north lat. $57^{\circ} 40'$.

WOLOGDA, the capital of a province of the same name in Russia, situated on the river Dwina: east long. $42^{\circ} 20'$, north lat. 59° .

WOLVERHAMPTON, a market-town of Staffordshire, eleven miles south of Stafford.

WOLVES TEETH, of an horse, are overgrown grinders, the points of which being higher than the rest, prick his

tongue and gums in feeding, so as to hinder his chewing. They are seldom met with in any besides young horses; but if they be not daily worn by chewing, they will grow up even to pierce the roof of the mouth.

WOMAN, *fœmina*, in zoology, the female of man. See the article MAN.

Women, from the very frame and constitution of their bodies, are liable to several diseases, which are peculiar to that sex, arising from a suppression or immoderate flux of the menses, from pregnancy, delivery, their milk, &c. all which may be found under their several articles; as MENSES, FLUOR ALBUS, ABORTION, MILK, &c.

For the english laws in relation to women, see the articles COVERTURE, BARON and feme, PARAPHERNALIA, WIFE, &c.

WOMB, *uterus*. See UTERUS.

WONDER. See the article MIRACLE.

The seven wonders of the world, as they are popularly called, were the egyptian pyramids; the mausoleum, erected by Artemesia; the temple of Diana, at Ephesus; the walls and hanging gardens of the city of Babylon; the colossus, or brazen image of the sun, at Rhodes; the statue of Jupiter Olympius; and the pharos, or watch-tower, of Ptolemy Philadelphus. See PYRAMID, MAUSOLEUM, COLOSSUS, PHAROS, &c.

WOOD, *lignum*, a solid substance, whereof the trunks and branches of trees consist. See the articles TREE, TRUNK, BRANCH, UNDERWOOD, &c.

The wood is all that part of a tree included between the bark and the pith. See the article BARK.

Dr. Grew, in his Anatomy of Plants, has discovered, by means of the microscope, that what we call wood in a vegetable, notwithstanding all its solidity, is only an assemblage of infinite minute canals, or hollow fibres, some of which rise from the root upwards, and are disposed in form of a circle; and the others, which he calls interstices, tend horizontally from the surface to the center; so that they cross each other, and are interwoven like the threads of a weaver's web. See VEGETATION, SAP, &c.

Notwithstanding this, M. Buffon observes, that the organization of wood is yet unknown in all its parts; and that though the world is greatly indebted to the observations of Grew, Malpighi, and Hales, yet when he entered on the

subject,

subject, he found there was much more unknown than known; and determined to observe, from its first state, the growth of trees, and the formation of their woody part. For this ingenious author's exposition of the texture, &c. of wood, and thence his calculation of the force and strength of timber used in building, we must refer the reader to his paper upon that subject, as published in the *Memoirs Acad. Par.* for the year 1740, and to what has been said under the article **TIMBER**.

Mortimer observes that all kinds of wood are to be preserved from the worm, and from many other occasions of decay, by oily substances, particularly the essential oils of vegetables. Oil of spike is excellent; and oil of juniper, turpentine, or any other of this kind, will serve the purpose; these will preserve tables, instruments, &c. from being eaten to pieces by these vermin; and linseed-oil will serve, in many cases, to the same purpose; probably nut-oil will do also, and this is a sweeter oil, and a better varnish for wood.

Some of the west-indian trees afford a sort of timber which, if it would answer in point of size, would have great advantages over any of the european wood in ship building for the merchant-service, no worm ever touching this timber. The acajou, or tree which produces the cashew-nut, is of this kind; and there is a tree of Jamaica, known by the name of the white-wood, which has exactly the same property; and so have many other of their trees.

To season wood expeditiously for sea-service, Mr. Boyle observes, that it has been usual to bake it in ovens.

The art of moulding wood is mentioned by Mr. Boyle as a desideratum in the art of carving. He says, he had been credibly informed of its having been practised at the Hague; and suspects that it might have been performed by some menstruum that softens the wood, and afterwards allows it to harden again, in the manner that tortoise-shell is moulded: or, perhaps, by reducing the wood into a powder, and then uniting it into a mass with strong but thin glue. And he adds, that having mixed saw-dust with a fine glue made of ising-glass, slightly straining out what was superfluous through a piece of linen, the remainder, formed into a ball and dried, became so

hard as to rebound when thrown against the floor.

The people who work much in wood, and that about small works, find a very surprising difference in it, according to the different seasons at which the tree was cut down, and that not regularly the same in regard to all species, but different in regard to each. The button-mould makers find that the wood of the pear-tree, cut in summer, works toughest; holly, on the contrary, works toughest when cut in winter; box is mellowest when it has been cut in summer, but hardest when cut about Easter; haw-thorn works mellow when cut about October, and the service is always tough, if cut in summer.

Wood used for fuel is required of various kinds, in regard to the various works to be performed by it.

Neri every where commends oak for the wood to be burnt in the glass-houses, as the properest wood for making a strong and durable fire with a good flame.

Imperato, on the contrary, recommends ash on the same occasion; because as he says it gives a substantial, rather than a great flame: and Camerarius deservedly commends juniper-wood, as affording a lasting, strong, and sweet fire, could plenty of it be had. Among the anti-cents, Pliny commends light dry wood; and Plutarch, the tamerisk in particular, for making the glass house-fires; but glass-making requires so great a fire as cannot be easily made from such wood. Nor can ash be proper, because, though it gives a good fire, it soon decays.

Woods are distinguished into divers kinds, with regard to their nature, properties, virtues, and uses. Of wood, considered according to its qualities, whether useful, curious, medicinal, &c. the principal is called timber, used in building houses, laying floors, roofs, machines, &c. See the article **TIMBER**.

Woods valued on account of their curiosity are cedar, ebony, box, calambo, &c. which by reason of their extraordinary hardness, agreeable smell, or beautiful polish, are made into tables, combs, beads, &c. See the article **EBONY**, &c. The medicinal woods are guaiacum, aloes, saffras, nephriticum, santal, sarsaparilla, aspalathum, &c. See **GUAIACUM**, **ALOES**, **SASSAFRAS**, &c.

Woods used in dying are the indian-wood, brazil wood, campechy wood, &c.

See the article BRAZIL, &c.
Fossile Wood. Fossile wood, or whole trees, or parts of them, are very frequently found buried in the earth, and that in different strata; sometimes in stone, but more usually in earth; and sometimes in small pieces loose among gravel. These, according to the time they have lain in the earth, or the matter they have lain among, and in the way of, are found differently altered from their original state; some of them having suffered very little change, and others being so highly impregnated with crystalline, sparry, pyritical, or other extraneous matter, as to appear mere masses of stone, or lumps of the common matter of the pyrites, &c. of the dimensions, and, more or less, of the internal figure of the vegetable bodies into the pores of which they have made their way.

The fossile-wood, which we find at this day, are, according to these differences, arranged, by Dr. Hill, into three kinds; 1. the less altered; 2. the pyritical; and, 3. the petrified.

Of the trees, or parts of them, less altered from their original state, the greatest store is found in digging to small depths in bogs, and among what is called peat or turf-earth, a substance used in many parts of the kingdom for fuel. In digging among this, usually very near the surface, they find immense quantities of vegetable matter buried, and that of various kinds: in some places there are whole trees scarce altered, except in colour; the oaks in particular being usually turned to a jetty black; the pines and firs, which are also very frequent, are less altered, and are as inflammable as ever, and often contain, between the bark and wood, a black resin. Large parts of trees have also been not unfrequently met with unaltered in beds of another kind, and at much greater depths, as in the strata of clay and loam, among gravel, and sometimes even in solid stone.

Besides these harder parts of trees, there are frequently found also in the peat-earth, vast quantities of the leaves and fruit, and catkins of the hazel, and the like trees: these are usually intermixed among the sedge and roots of grass, and are hence at all altered from their usual texture. The most common of these are hazel nuts; but there are frequently found also the twigs and leaves of the

white poplar; and a little deeper usually there lies a cracked and shattered wood, the crevices of which are full of a bituminous black matter; and among this the stones of plumbs, and other stone-fruits, are sometimes found, but that more rarely.

It is idle to imagine, that these have been thus buried either at the creation; or, as many are fond of believing, at the universal deluge: at the first of these times the strata must have been formed before the trees were yet in being; and the peat-wood is so far from being of antediluvian date, that much of it is well known to have been growing within these three hundred years, in the very places where it is now found buried.

In this state, that is little altered from their original condition, it is, that the fruits, and larger parts of trees are usually found; what we find of them more altered, are sometimes large and long, sometimes smaller and shorter, branches of trees; sometimes small fragments of branches and more frequently small shapeless pieces of wood. The larger and longer branches are usually found bedded in the strata of stone, and are more or less altered into the nature of the stratum they lie in: the shorter and smaller branches are found in vast variety in the strata of blue clay, used for making tiles in the neighbourhood of London; these are prodigiously plentiful in all the clay-pits of this kind, and usually carry the whole external resemblance of what they once were, but nothing of the inner structure; their pores being wholly filled, and undistinguishably closed by the matter of the common vitriolic pyrites, so as to appear mere simple masses of that matter. These fall to pieces on being long exposed to a moisture, and are so pregnant in vitriol that they are what is principally used for making the green vitriol or copperas at Deptford, and other places. See the articles VITRIOL and COPPERAS.

The irregular masses or fragments of wood, are principally of oak, and are most usually found among gravel; tho' sometimes in other strata. These are variously altered by the insinuation of crystalline and stony particles, and make a very beautiful figure when cut and polished, as they usually keep the regular grain of the wood, and shew exactly the several circles which mark the different years growth. These, according to the

the different matter which has filled their pores, assume various colours, and the appearance of the various fossils that have impregnated them; some are perfectly white, and but moderately hard; others of a brownish black, or perfectly black, and much harder; others of a reddish black, others yellowish, and others greyish, and some of a ferrugineous colour. They are of different weights also and hardneses, according to the nature and quantity of the stony particles they contain: of these some pieces have been found with every pore filled with pure pellucid crystal; and others in large masses, part of which is wholly petrified and seems mere stone, while the rest is crumbly and is unaltered wood. That this alteration is made in wood, even at this time, is also abundantly proved by the instances of wood being put into the hollows of mines, as props and supports to the roofs, which is found after a number of years as truly petrified as that which is dug up from the natural strata of the earth. In the pieces of petrified wood found in Germany, there are frequently veins of spar or of pure crystal, sometimes of earthy substances, and often of the matter of the common pebbles: these fragments of wood sometimes have the appearance of parts of the branches of trees in their natural state; but more frequently they resemble pieces of broken boards; these are usually capable of a high and elegant polish.

Many substances, it is certain, have been preserved in the cabinets of collectors, under the title of petrified wood, which have very little right to that name. But where the whole outer figure of the wood, the exact lineaments of the bark, or the fibrous or fistular texture of the stræ, and the vestiges of the utriculi and trachææ, or air-vessels, are yet remaining, and the several circles yet visible, which denoted the several years growth of the tree, none can deny these substances to be real fossil wood.

Cord of WOOD. See *CORD of Wood.*

Cutting in WOOD, is used for various purposes; as for initial and figured letters, head and tail-pieces of books; and even for schemes, mathematical and other figures, to save the expence of engraving on copper: and for prints, and stamps for papers, calicoes, linens, &c.

The invention of cutting in wood, as well as that in copper, is ascribed to a goldsmith of Florence; but Albert Du-

rer and Lucas brought both these arts to perfection.

About 200 years ago, the art of cutting in wood was carried to a very great pitch, and might even vie, for beauty and justness, with that of engraving on copper: at present it is much neglected, the application of artists being wholly employed on copper, as the more easy and promising province: not but that wooden cuts have the advantage of those in copper in many respects; chiefly for figures and devices in books; as being printed at the same time and in the same press with the letters: whereas, for the other, there is required a particular and separate impression.

The cutters in wood begin with preparing a plank or block of the size and thickness required, and very even and smooth on the side to be cut: for this they usually take pear-tree, or box; but the latter is best, as being closest, and least liable to be worm eaten. On this block they draw their design with a pen or pencil, exactly as they would have it printed; or they fasten the design drawn on paper upon the block with paste and a little vinegar, the strokes or lines turned towards the wood. When the paper is dry, they wash it gently with a sponge dipped in water, and then take it off by little and little, rubbing it first with the tip of the finger, till nothing is left on the block but the strokes of ink that form the design, which mark out what part of the block is to be spared or left standing. The rest they cut off very carefully with the points of very sharp knives, chisels, or gravers, according to the bigness or delicacy of the work.

Measure of WOOD. See *MEASURE.*

Painting on WOOD, &c. See the article *PAINTING, &c.*

WOOD, sylva, in geography, a multitude of trees extended over a large continued tract of land, and propagated without culture. The generality of woods only consist of trees of one kind.

The antient Saxons had such a veneration for woods, that they made them sanctuaries.

It is ordained, that none shall destroy any wood, by turning it into tillage or pasture, &c. where there are two acres or more in quantity, on pain of forfeiting 40s. an acre, by 35 Hen. VIII. c. 17. All woods that are felled at fourteen years growth, are to be preserved from destruction for eight years; and no

cattle put into the ground till five years after the felling thereof, &c. 13 Eliz. c. 25. The burning of woods, or under-wood, is declared to be felony; also those persons that maliciously cut or spoil timber-trees, or any fruit-trees, &c. shall be sent to the house of correction, there to be kept three months, and whipt once a month.

WOODBRIDGE, a market-town of Suffolk, situated twenty-six miles south-east of Bury.

WOOD-COCK, *scelopax*, in ornithology. See the article **SCOLOPAX**.

WOOD-COCK-SHELL, in natural history, the variegated yellowish purpura, with tubercles, and a long beak; and the thorny wood-cock-shell is the yellow long beaked purpura, with long and crooked spines. See **PURPURA**.

WOOD-CORN, is said to be corn given by the tenants of some manors to the lords for the liberty to gather up wood, and the feeding of cattle, there.

WOOD-COPPICE. See **COPPICE**.

WOOD and **WOOD**, in the sea-language, is when two pieces of timber are so let into each other, that the wood of the one joins close to the other.

WOOD-GELD, or **WOODGELDUM**, in our antient customs, the gathering or cutting of wood within the forest; or it may denote the money paid for the same to the foresters. Sometimes it also seems to signify an immunity from this payment by the king's grant.

WOOD-HAY, an antient custom at Exeter, whereby a log out of every seam of wood over Ex-bridge is taken, towards the reparation of that bridge.

WOOD-LOUSE, in zoology, a name given to several species of oniscus. See the article **ONISCUS**.

The common wood-louse, or millepes, is the oniscus with a blunt forked tail. See the article **MILLEPES**.

The black wood-louse is the oniscus with an obtuse undivided tail, growing to an inch in length, and being of an oval figure; and the sea-wood-louse is the oniscus, with a subulated tail, appendiculated on each side.

WOOD-MOTE, the antient name of that forest-court, now called the court of attachment. See the articles **ATTACHMENT** and **FOREST**.

WOOD-PLEA-COURT, a court held twice a year in the forest of Clun, in Shropshire, for determining all matters relating to wood.

WOOD-PECKER, *picus*, in ornithology, a genus of birds with the beak straight, of a polyhedral or many-sided figure, and with its point formed in the manner of a wedge; the tongue is rounded and very long, it resembles in form a worm, or some other such insect; the toes, in all but one species, stand two before and two behind, as in the parrot. This genus comprehends the great black wood-pecker, with a scarlet-head, in size somewhat larger than that of a fieldfare; the green wood-pecker, with a scarlet crown; the great spotted wood-pecker, with a black head, and some of the tail-feathers white; the lesser spotted wood-pecker, with three lateral retrices, variegated with white at top; the middle spotted wood-pecker, with three lateral retrices, half black; the three-toed wood-pecker, with only three toes; the brasilian wood-pecker, or *ipeçu*, with a scarlet crested head; and the golden wood-pecker, or the yellow *picus*. There are various other species of wood-peckers, as the brown *picus*, spotted with yellow; the black *picus*, with the wings and tail yellow, &c.

WOODSTOCK, a borough-town of Oxfordshire, situated seven miles north of Oxford.

It sends two members to parliament.

WOODWARD, an officer of the forest, whose function it is to look after the woods, and observe any offences either in vert or in venison, committed within his charge, and to present the same; and in case any deer are found killed, or hurt, to inform the verderer thereof, and to present them at the next court of the forest. See the article **FOREST**.

WOOF, among manufacturers, the threads which the weavers shoot across with an instrument called the shuttle. See the articles **SHUTTLE**, **WARP**, **WEB**, **WEAVING**, **CLOTH**, &c.

The woof is of different matter, according to the piece to be wrought. In taffety, both woof and warp are silk. See the article **TAFFETY**.

In mohairs, the woof is usually wool, and the warp silk. In sattins, the warp is frequently flax, and the woof silk. See **SERGE**, **SATTIN**, **VELVET**, &c.

WOOL, the covering of sheep. See the article **SHEEP**.

Each fleece consists of wool of several qualities and degrees of fineness, which the dealers therein take care to separate. The English and French usually separate each

each fleece into three principal sorts, *viz.*
 1. Mother-wool, which is that of the back and neck. 2. The wool of the tails and legs. 3. That of the breast and under the belly. The wool most esteemed is the english, chiefly that about Leominster, Cotswold, and the Isle of Wight; the Spanish, principally that about Segovia; and the French, about Berry.

The fineness and plenty of our wool is owing in a great measure to the short sweet grafs in many of our pastures and downs; though the advantage of our sheeps feeding on this grafs all the year, without being obliged to be shut up under cover during the winter, or to secure them from wolves at other times, contributes not a little to it.

Antiently, the principal commerce of the nation consisted in wool unmanufactured; which foreigners, especially the French, Dutch, and Flemish, bought of us, insomuch, that the customs paid on wool exported in the reign of Edward III. amounted, at 50s. a pack, to 250,000l. per annum. An immense sum in those days! But as wool is now accounted a staple commodity, the employment of an infinite number of people at home, and our most beneficial trade abroad, depending upon it, very severe laws have been made to prevent its being exported, and persons that export wool beyond the seas, are liable to a forfeiture of the ships or vessels in which it is found, with treble the value, and the persons aiding and assisting in it shall suffer three years imprisonment. It is also enacted, that no sheep shall be carried on board any ship with intent to be exported, upon forfeiture of 20s. for every sheep; that the owners knowing thereof, are to forfeit their interest therein; that if they be aliens, or natural born subjects not inhabiting this kingdom, such ships shall be wholly forfeited; that the masters and mariners knowing thereof, and assisting therein, are to forfeit all their goods and chattels, and to suffer three months imprisonment; and that the exporter, besides other penalties, shall be rendered incapable of suing for any debt, &c. As to the importation of wool, Irish wool, combed or uncombed, Spanish and Polish wool may be imported duty free.

WOOL, is also used for the soft hair growing on several wild beasts, the skins of which are distinguished by the name of furs. See the article FUR.

These kinds of wool, on being imported, pay the following duties: beaver-wool, cut and combed, 14s. 4d. the pound: the whole of which is drawn back on exportation: but if this wool be combed in Russia, and imported from thence in british ships, it is free. Coney wool,

the pound, $1\frac{43}{100}$ d. draw back $1\frac{29}{100}$ d.

Estridge-wool, imported in british built ships, free; but if imported in those that are foreign built, it pays 6s. 8 $\frac{43}{100}$ d. the 112 pounds: draw back, 6s. $1\frac{43}{100}$ d.

Stanes-wool, the pound $7\frac{1}{10}$ d. draw

back $6\frac{4}{10}$ d.

For the divers preparations of wool, see CARDING, COMBING, SPINNING, WEAVING, FULLING, CLOTH, &c.

Cotton-WOOL. See the article COTTON.

WOOL-STAPLE, denotes a city or town where wool used to be sold. See the article STAPLE.

WOOL-WINDERS, are persons employed in winding up fleeces of wool into bundles to be packed and sold by weight. Those are sworn to do it truly between the owner and the merchant.

Pocket of WOOL. See the article POCKET.

Salplar of WOOL. See SALPLAR.

WOOLEN MANUFACTORY, includes the several sorts of commodities into which wool is wrought, as broad cloth, long and short kerseys, bays, serges, flannel, perpetuanas, says, stuffs, frieze, pennistones, stockings, caps, rugs, &c. See the article CLOTH, &c.

WOOLSTED. See the article WORSTED.

WOOLWICH, a market-town of Kent, situated on the river Thames, six miles east of London.

WORCESTER, the capital city of Worcestershire, situated on the river Severn, 110 miles north-west of London: west long. $2^{\circ} 15'$, north lat. $52^{\circ} 5'$.

WORCUM, a town of Holland, situated on the river Waal, twenty-three miles east of Rotterdam. This is also the name of a port-town of the United Netherlands, situated on the province of Friesland, on the Zuyder sea, twenty miles south-west of Lewarden.

WORD, in language, an articulate sound designed to represent some idea. See SOUND, VOICE, SIGN, IDEA, &c.

The port-royalists define words to be distinct articulate sounds, agreed on by mankind to convey their thoughts and sen-

timents by. See the article **LANGUAGE**. Word, in writing, is defined to be an assemblage of several letters forming one or more syllables, and expressing the name, quality, or manner of a thing. See the articles **LETTER**, **SYLLABLE**, **QUALITY**, &c.

Etymology and syntax being the two parts of grammar conversant about words, the first of these explains the nature and propriety of words, and the other treats of the right composition of words in discourse. See the articles **GRAMMAR**, **ETYMOLOGY**, &c.

The most remarkable thing in the pronouncing of words, is the accent, or the elevation of the voice, on some particular syllable of the word, which elevation is necessarily followed by a depression of the voice. See the article **ACCENT**.

Grammarians generally divide words into eight classes, called parts of speech. See **SPEECH**, and **PARTS of Speech**.

Words are again divided into primitives and derivatives, simple and compound, synonymous and equivocal. See the article **PRIMITIVE**, &c.

With regard to their syllables, words are farther divided into monosyllables and polysyllables. See the articles **MONOSYLLABLE** and **POLYSYLLABLE**.

The grammatical figures of words which occasion changes in the form, &c. thereof are prosthesis, aphæresis, syncope, epenthesis, apocope, paragoge, crasis, diæresis, metathesis, and antithesis. See the article **PROSTHESIS**, &c.

The use of words, we have observed, is to serve as sensible signs of our ideas; and the ideas they stand for in the mind of the person that speaks, are their proper significations. See the articles **SIGN**, **SEMEIOTICA**, **SCIENCE**, &c.

Simple and primitive words have no natural connection with the things they signify, whence there is no rationale to be given of them; it is by mere arbitrary institution and agreement of men, that they come to signify any thing. Certain words have no natural propriety or aptitude to express certain thoughts more than others; were that the case there could have been but one language. But in derivative, and compound words the case is somewhat different. In the forming of these, we see regard is had to agreement, relation, and analogy; thus most words that have the same ending, have one common and general way of denoting or signifying things; and those

compounded with the same prepositions, have a similar manner of expressing and signifying similar ideas, in all the learned languages where they occur.

For the perfection of language, it is not enough, Mr. Locke observes, that sounds can be made signs of ideas, unless these can be made use of so as to comprehend several particular things; for the multiplication of words would have perplexed their use, had every particular thing needed a distinct name to be signified by. To remedy this inconvenience, language had a further improvement in the use of general terms, whereby one word was made to mark a multitude of particular existences; which advantageous use of sounds was obtained by the difference of the ideas they were made signs of, those names becoming general which are made to stand for general ideas, and those remaining particular, where the ideas they are used for are particular. See the articles **TERMS**, **GENERAL**, **ABSTRACT**, &c.

It is observable, that the words which stand for actions and notions, quite removed from sense, are borrowed from sensible ideas; as to imagine, apprehend, comprehend, understand, adhere, conceive, instil, disgust, disturbance, tranquillity, &c. which are all taken from the operations of things sensible, and applied to modes of thinking. Spirit, in its original signification, is no more than breath; angel, a messenger. By which we may guess what kind of notions they were, and whence derived, which filled the minds of the first beginners of languages; and how nature, even in the naming of things unawares, suggested to men the originals of all their knowledge: whilst to give names that might make known to others any operations they felt in themselves, or any other ideas that came not under their senses, they were forced to borrow words from the ordinary and known ideas of sensation. See **SENSATION**, **PERCEPTION**, &c.

The ends of language, in our discourse with others, are chiefly three; first, to make our thoughts or ideas known one to another. This we fail in, 1. when we use names without clear and distinct ideas in our mind. 2. When we apply received names to ideas, to which the common use of that language doth not apply them. 3. When we apply them unsteadily, making them stand now for one, and anon for another idea. Secondly,

condly, to make known our thoughts with as much ease and quickness as possible. This men fail in, when they have complex ideas, without having distinct names for them, which may happen either through the defect of a language which has none, or the fault of the man who has not yet learned them. Thirdly, to convey the knowledge of things. This cannot be done but when our ideas agree to the reality of things. He that has names without ideas, wants meaning in his words, and speaks only empty sounds. He that has complex ideas without names for them, wants dispatch in his expression. He that uses his words loosely, and unsteadily, will either not be minded or not understood. He that applies names to ideas, different from the common use, wants propriety in his language, and speaks gibberish; and he that has ideas of substances disagreeing with the real existence of things, so far, wants the materials of true knowledge. See the articles **IDEA** and **KNOWLEDGE**.

WORD, or *Watch-WORD*, in an army or garrison, is some peculiar word or sentence, by which the soldiers know and distinguish one another in the night, &c. and by which spies and designing persons are discovered. It is used also to prevent surprizes. The word is given out in an army every night to the lieutenant, or major-general of the day, who gives it to the majors of the brigades, and they to the adjutants; who give it first to the field-officers, and afterwards to a serjeant of each company, who carry it to the subalterns. In garrisons it is given after the gate is shut to the town-major, who gives it to the adjutants, and they to the serjeants. See **ROUNDS**.

WORD, in heraldry, &c. See **MOTTO**.

WORDS, in law, which may be taken in a common sense, should not receive a strained or unusual construction; and such as are ambiguous, are to be construed so as to make them stand with law and equity, neither may they be wrested to do wrong: nevertheless the different placing of the same words may cause them to have a different meaning; also where words are either senseless or needless in a deed, they shall do no hurt, if the same is good and perfect without those words.

WORK, in the manege. To work a horse, is to exercise him at pace, trot, or gallop, and ride him at the manege. To work

a horse upon volts, or head and haunches in or between two heels, is to passage him, or make him go side-ways upon two parallel lines.

WORK-HOUSE. See *Work-House*.

WORKS, *opera*, in fortification, the several lines, trenches, ditches, &c. made round a place or army, or the like, to fortify and defend it. See the articles **FORTIFICATION**, **LINE**, **TRENCH**, &c.

For the several sorts of works, as clock-work, fire-work, fret-work, horn-work, rustic-work, wax-work, &c. see the articles **CLOCK-work**, **FIRE-work**, &c.

WORKSOP, a market-town of Nottinghamshire, situated twenty miles north of Nottingham.

WORLD, *mundus*, the assemblage of parts which compose the universe. See the article **UNIVERSE**.

The duration of the world is a thing which has been greatly disputed. Plato, after Ocellus Lucanus, held it to be eternal, and to have flowed from God as rays flow from the sun. Aristotle was much of the same mind; he asserts, that the world was not generated so as to begin to be a world, which before was none: he lays down a pre-existing and eternal matter as a principle, and thence argues the world eternal. His arguments amount to this, that it is impossible an eternal agent, having an eternal passive subject, should continue long without action. His opinion was generally followed, as seeming to be the fittest to end the dispute among so many sects about the first cause. See the articles **MATTER**, **CAUSE**, and **PERIPATETIC Philosophy**.

Epicurus, however, though he makes matter eternal, yet shews the world to be but a new thing formed out of a fortuitous concourse of atoms. See the articles **ATOMICAL** and **EPICUREAN**.

Some of the modern philosophers refute the imaginary eternity of the world by this argument, that if it be *ab eterno*, there must have been a generation of individuals in a continual succession from all eternity, since no cause can be assigned why they should not be generated, *viz.* one from another. Therefore to consider the origin of things, and the series of causes, we must go back in infinitum, *i. e.* there must have been an infinite number of men and other individuals already generated, which subverts the very notion of number. And if the cause which now generates has been produced

by

by an infinite series of causes, how shall an infinite series be finite? Dr. Halley suggests a new method of finding the age of the world from the degree of the saltiness of the ocean. See SEA.

System of the WORLD. See SYSTEM.

WORMS, in the linnaean system of nature, a class of insects of the order of the apteria, and of the class of the anarthra. See APTERIA and ANARTHRA.

The distinguishing character of this class is, that they have the muscles of their body affixed to a solid basis. The several species of worms are very numerous; as the chætia, or the hair worm, called also the guinea-worm; the ascaris, the lumbricus, or earth-worm; and sea-worm; the tænia or tape-worm; the sicyania or gourd-worm; the iulus or gally-worm, &c. See CHÆTIA, &c.

WORMS, in husbandry, are very prejudicial to corn-fields, eating up the roots of the young corn, and destroying great quantities of the crop. Sea-salt is the best of all things for destroying them. Sea-water is proper to sprinkle on the land, where it can be had; where the salt springs are, their water will do; and where neither are at hand, a little common or bay-salt does as well. Soot will destroy them in some lands, but is not to be depended upon, for it does not always succeed. Some farmers strew on their lands a mixture of chalk and lime; and others trust wholly to their winter-fallowing to do it, if this is done in a wet season, when they come up to the surface of the ground, and some nails with sharp heads be driven into the bottom of the plough. If they are troublesome in gardens, the refuse brine of salted meat will serve the purpose, or some walnut leaves steeped in a cistern of water for a fortnight or three weeks, will give it such a bitterness that it will be a certain poison to them. A decoction of wood-ashes, sprinkled on the ground, will answer the same purpose; and any particular plant may be secured both from worms and snails by strewing a mixture of lime and ashes about its roots. It is a general caution among the farmers to sow their corn as shallow as they can, where the field is very subject to worms.

Generation of WORMS. See the article GENERATION.

WORMS, in medicine, a disease arising from some of these reptiles being in-

gendered in the body, particularly in the stomach and intestines.

When children begin to use crude aliments, summer fruits, flesh, cheese, and other things of the like kind, they are frequently troubled with the worms, occasioned by the eggs of insects, which either float in the air, or live on the earth, and which being casually swallowed, are not digestible by their tender stomachs. For these, the intestinal or gastric puit, afford a nest in which they reside, are nourished, bred, and increase in bulk. Hence they are not so common in adults, except in the dull and sluggish, and in the leuco-phlegmatic.

There are three species of worms, most frequent in the human body; the lumbrici, the ascarides, and the tænia. The lumbrici are found in the ilion, and are thus called, because they are generally broad and long, and roll themselves up in a strange manner. The ascarides have their seat chiefly in the gross intestines, and are more plentiful in the rectum; they are round and small, and are thrown out in large quantities. The broad worm called tænia, is like a swathe, commonly two ells long, but sometimes much longer, and divided through the whole length with cross joints or knots. This is said to be always single; and lies variously convoluted, being sometimes as long as all the guts, and sometimes even vastly exceeding that length. Heister observes, that there are other kinds of insects, or worms, generated in an human body, which physicians have not placed in any particular class, but have looked upon them as uncommon productions.

Worms, by their irritation, create nausea, vomitings, loosenesses, faintings; a slender, deficient, intermitting pulse; itching of the nose, and epileptic fits. By the consumption of the chyle, they produce hunger, paleness, weakness, and costiveness; whence arises a tumour of the abdomen, eruptions, and rumbling of the intestines.

A child may be known to have the worms from his age, cold temperament, paleness of the countenance, livid eyelids, hollow eyes, itching of the nose, voracity, startings, and grinding the teeth in sleep; and more especially by a singular sinking breath; but when they are voided by the mouth, or anus, there remains no manner of doubt.

The cure is to be performed chiefly by destroy-

destroying their nests, which is to be attempted by alkalious salts; gums which purge phlegm, mercurials, antimonials, and bitter aromatics.

Earth WORM, *lumbricus*, a genus of insects of the class of the anathra, of a rounded shape, and covered with a soft and tender skin, marked with annular ridges and furrows. This insect, when full grown, is often ten inches in length, and more than a third of an inch in diameter; its colour is a dusky red, and its skin is formed into rings, but is smooth and soft to the touch.

Sea WORM, is the rough *lumbricus*, growing to a foot, or more in length, and to the thickness of a man's finger.

Guinea WORMS, *dracunculi*. See the article **DRACUNCULI**.

WORM, in gunnery, a screw of iron, to be fixed on the end of a rammer, to pull out the wad of a firelock, carabine, or pistol, being the same with the wad-hook, only the one is more proper for small arms, and the other for cannon.

WORM, in chemistry, is a long, winding, pewter pipe, placed in a tub of water, to cool and condense the vapours in the distillation of spirits.

WORM, a *cable*, or *hawser*, in the sea-language, is to strengthen it by winding a small line, or rope, all along between the strands.

WORMS, in geography, an imperial city of Germany, in the palatinate of the Rhine: east long. $8^{\circ} 5'$, north lat. $49^{\circ} 38'$.

WORM-SEED, *semen santenicum*, is the seed of a species of worm-wood, which grows in the Levant, from whence we have the seed, which is there produced in great plenty, without the trouble of sowing; this plant growing wild in the fields. See **WORMWOOD**.

The seed of this plant is light and chaffy, enveloped with a vast many thin membranes, that have the same virtue with the seed itself, and are used with it under its name. It is a small and light seed, of a pale yellowish brown colour, with some admixture of greenish in it, of an oblong form, somewhat larger at the base, and tapering to a point at the summit. It is of a friable texture, easily beat to powder. It has not much smell, but is of a bitter taste. Worm-seed is to be chosen large, fresh and clean, not dusty or decayed, or hanging together in clusters, which is a sign of insects being, or having been among it.

Its great virtue is that of destroying

worms in children: but as it is too bitter to be easily swallowed by them either in powder or decoction; it is therefore best taken by way of comfit covered over with sugar.

Worm-seed, on being imported, pays a duty of $7\frac{1}{2}$ d. the pound, and draws back, $6\frac{1}{8}\frac{3}{4}$ d.

WORMWOOD, *absinthium*, in botany.

See the article **ABSINTHIUM**.

Wormwood, besides the virtues attributed to it under its generical name, is prepared into an oil, and fixed salt, the former of which is used externally to the belly, to destroy worms in the intestines, and the latter is a famous febrifuge and stomachic.

WORONETS, or **VERONESE**, a city of Russia, in the province of Belgorod, situated on the river Veronese, near its confluence with the Don: east long. 40° , north lat. 52° .

WORSHIP of God, the offering up of adoration, prayer, praise, thanksgiving and confession to God, as our creator, benefactor, law-giver and judge.

Internal piety, or the worship of the mind, is that which flows from the heart in devout aspirations addressed to the deity without the use of verbal expressions uttered in an audible manner. External worship is founded on the same principles as the internal, and is either private or public. A worship that is purely intellectual, is too spiritual and abstracted for the bulk of mankind. The operations of their minds, especially such as are employed on the most sublime objects, must be assisted by their outward organs, otherwise they will be soon dissipated by sensible impressions, or grow tiresome if too long continued: for ideas are such fleeting things, that they must be fixed; and so subtle, that they must be expressed and delineated, as it were, by sensible marks and images, otherwise we cannot long attend to them. Hence arises the necessity of external worship, which by stated acts of devotion, fixes our attention, composes and enlivens our thoughts, impresses us more deeply with a sense of the awful presence in which we are, and tends to heighten our devout affections. This holds true in the case of public worship; for as God is the parent and head of the social system, and has formed us for a social state; as there are public blessings, and crimes in which we have all, in some degree, a share; and public wants and dangers, to which all

are exposed; it is therefore evident, that solemn offices of public worship are duties of indispensable moral obligation, among the best cements of society, the firmest prop of government, and the fairest ornament of both.

WORSTED, a kind of woollen thread, which, in the spinning, is twisted harder than ordinary. It is chiefly used either wove or knit into stockings, caps, gloves, or the like.

WORSTED, a market-town of Norfolk, situated seven miles north of Norwich.

WOTTON, a market-town of Gloucestershire, situated seventeen miles south of Gloucester.

WOTTEN BASSET, a borough-town of Wiltshire, twenty-five miles north of Salisbury; which sends two members to parliament.

WOULDING, a sea-term for the winding of ropes, round a mast or yard of a ship, that has been strengthened by a piece of timber nailed to it.

WOUND, *vulnus*, in medicine and surgery, is frequently defined to be a violent solution of the continuity of the soft external parts of the body made by some instrument. Others take a greater latitude in defining it, and call every external hurt of the body, by what cause soever produced, a wound. On the other hand, some are of opinion, that unless the injured parts of the body are divided by some sharp instrument, as by a sword or knife, it is by no means to be called a wound; but notwithstanding, it is certain that those wounds which are produced by blunt instruments may properly enough be called wounds, whence Heister distinguishes two different kinds of wounds, the one made by acute, the other by blunt instruments.

Wounds are generally inflicted upon the softer parts of the human body, such as the skin, fat, muscular flesh, ligaments, blood-vessels, and nerves, and parts that are composed of these, as the viscera and intestines; yet the more solid parts of the body are by no means to be here excluded, as the bones, whence the parts that are subject to those injuries will afford two distinctions of wounds; one, wounds of the soft parts, the other, wounds of the bones.

As causes of wounds, all instruments of what kind soever, whether blunt or sharp, may properly be reckoned, provided they are of such a nature, that upon the violent external application of

them, they are capable of producing a solution of continuity in the parts of the body upon which they are inflicted; for a solution of the external parts from an internal cause, is not called a wound, but rather an abscess, or ulcer; so when the harder parts of the body, to wit, the bones, are broken by a fall, or a violent blow received from a blunt instrument, it is termed a fracture. See the articles **ABSCESS**, **ULCER**, **FRACTURE**, and **CONTUSION**.

The effects which are produced by wounds, besides the division of the softer parts, are generally profusions of blood, though they are sometimes attended with much greater mischiefs than these, for it can scarcely happen, but that the divided parts must, in some measure, if not totally, lose their natural functions, according to the different uses for which the part is intended, and according to the different degrees of injury that it receives. The greater number of uses a part is intended for by nature, the worse will be the consequences of a wound upon that part; this principle is so extensive, that it is the constant guide in forming a prognostic, whether the wound will prove mortal or not. He therefore, who is best skilled in anatomy, that is, best instructed in the situation of the parts, and their uses, will be enabled to form the most accurate judgment of the consequence that will necessarily attend a wound upon any particular part.

What has been said of the different situations and causes of wounds, sufficiently demonstrates, that there are many different kinds of wounds, some brought on by a puncture, some by a stab, and some again by a blow; some are curable, others incurable; some are made with sharp instruments, others with blunt ones; with regard to their figure, some form a right line, others are curved, transverse, or oblique; with respect to their situation, some are placed in the head, others in the neck, thorax, or abdomen; and of these some are internal, others external; variety of different wounds arise from the great diversity of condition that wounds are left in, for in some wounds, the inflicting instrument, or part of it, remains; for instance, a leaden bullet, a piece of glass, or of a grenade; the points of swords or arrows: but in some wounds, nothing of this kind is left: sometimes fractures of the bones accompany wounds, which is generally the case in gun-shot wounds;

wounds: some wounds are also attended with poison, as those which are made with poisoned arrows; under this head may be ranked the bites of animals, but more particularly of mad or venomous animals. Some are of opinion, that wounds which are made with copper, or silver instruments, should be reckoned in this class, the poison of which, if there is any, is owing to the vitriol that is mixed with these metals. See the articles **PUNCTURE, STAB, BLOW, NECK, THORAX, ABDOMEN, GUN-SHOT-wounds, POISON, &c.**

In slight wounds, where no considerable artery, nerve, or tendon is concerned, the following appearances are usually remarkable; at first sight the wound appears as a red line drawn upon the part: but upon being dilated, the blood instantly gushes out in greater or smaller quantities, according to the size and number of the blood-vessels that are injured. The hæmorrhage, after a short continuance, stops of its own accord, and the blood concreting in the wound, forms a crust; the lips of the wound now begin to look red, and swell, and are attended with some degree of pain and inflammation; if it is a large wound, a fever, that is to say, an universal heat and quickness of pulse, almost always ensue upon the third or fourth day; sooner or later, a whitish glutinous humour, not unlike white oil, appears, and this is known by the name of pus, or matter; upon the appearance of matter, the redness, tumour, pain, inflammation, and fever, disappear entirely, or at least are abated; and these are the signs of a wound inclining to heal; for under the matter new flesh springs up from the wounded vessels, which having by degrees filled the wound, dries upon its upper part, and forms a cicatrix. See the articles **VEIN, ARTERY, NERVE, TENDON, HÆMORRHAGE, PUS, TUMOUR, INFLAMMATION, and CICATRIX.**

In dangerous wounds, that is, where any considerable blood-vessel is wounded or divided, there generally ensues so violent a hæmorrhage, that the wounded person is in an instant sensible of great loss of spirits, and weakness, and faints away: and when the larger arteries are wounded, whether they are internal or external, he dies upon the spot; although somewhat less danger is apprehended from wounds that are inflicted upon the vessels which are situated upon the ex-

ternal parts of the body (some few excepted) because they will admit of the ligature, and other means of restraining the violence of the hæmorrhage.

There is nothing will give a truer light into the nature and consequence of a deep wound, than a due consideration of what natural actions of the body are impeded thereby. For instance, in wounds of the breast, when the patient draws his breath with shortness and difficulty, and is at the same time attended with an hæmoptysis and hiccoughs, it may be rationally conjectured that the lungs or the diaphragm are wounded; so in wounds of the abdomen, when chyle is voided, it is a plain indication that the stomach, small guts, or lacteals, are wounded: when excrements pass by the wound, the great guts are wounded. In the same manner, bilious blood shews the liver or gall bladder to be divided: if urine passes by the wound, the urinary bladder, or else the ureters, are wounded; and bloody urine denotes a blow on the kidneys, or a wound of the bladder; but when there are large profusions of blood this way, it is a sign that some of the larger blood-vessels are wounded: vomiting of blood, declares the stomach to be the injured organ: violent pains, attended with convulsive twitches, shew that a nerve is wounded, or else that some foreign substance is left in the wound. Whenever the senses are disordered after a wound received on the head, a concussion of the brain is much to be feared. Difficulty of breathing, pains in the breast, and hiccoughing, are symptoms of a wound in the diaphragm: It is of bad consequence for a wound to be attended with a large tumour; but it is of the last consequence if it is attended with no degree of tumour at all; the first is an indication of great inflammation, the last of mortification; some degree of tumour is always therefore best in wounds.

In order to inquire what wounds admit of a cure, and what are incurable, Heister divides wounds into three sorts.

1. Some wounds are absolutely of themselves mortal. 2. Others are in their own nature mortal, if not relieved by timely assistance. And, 3. Others become mortal by accident or imprudent treatment, though they were otherwise curable.

1. We properly style those wounds mortal which are not to be reme-

died by all the art and industry of man. Thus, wounds are of this kind which are attended with so violent an hemorrhage, as to produce instant death: of this sort are reckoned wounds that penetrate the cavities of the heart, and all those wounds of the viscera, where the large blood-vessels are opened; such are large wounds of the lungs, liver, spleen, kidneys, stomach, intestines, mesentery, pancreas, uterus; of the aorta, of the iliac, coliac, renal, mesenteric, and carotid arteries; especially if they are wounded near their origin; of the subclavian also, or vertebral; of the vena cava, the iliac vein, the internal jugular, vertebral, renal, mesenteric; of the vena porta, and of the larger veins that lie deep in the body, because their situation will not admit of proper applications to restrain the flux of blood. Heister therefore reckons; very justly, these among the wounds that are absolutely incurable, since they are not remediable either by astringents, ligature, or fire.

Those wounds also are not less mortal than the former, which obstruct, or entirely cut off the passage of the animal spirits to the heart; such are wounds of the cerebellum, of the medulla oblongata, and some violent strokes of the brain itself. There is reason to apprehend very great danger, when the small veins or arteries, which are contained in the cranium, are injured; for the blood flowing from them into the internal sinuses of the brain, either produces too great a pressure upon those very tender parts of the brain, and so obstructs the course of the blood and spirits; or else, being corrupted, it putrifies the brain itself, if it cannot be evacuated by the assistance of the trepan; which is the case when this accident happens at the lower part of the cranium, or in the sinuses of the brain; nor is there less danger where the nerves, which tend to the heart, are wounded, or entirely divided; for, after this, it is impossible for the heart to continue its motion. See the articles TREPAN, HEART, &c.

To this class are to be referred also all wounds which entirely deprive the animal of the faculty of breathing; there is therefore great danger where the aspera arteria is intirely divided; for where it is only divided in part, it may be healed again by the assistance of an expert surgeon: to this place also belong violent shocks of the bronchia, mediastinum, and

diaphragm, especially the tendinous part of it. See ASPERA ARTERIA, &c.

Those wounds also which interrupt the course of the chyle to the heart, are no less incurable than the former; such are wounds of the stomach, intestines, receptacle of the chyle, thoracic duct, and larger lacteals; to which may be also added wounds of the oesophagus, if they are large; though death is not so sudden an attendant on these wounds; but, for want of nourishment, the persons afflicted by them are weakened by degrees, and at length die consumptive. See the articles STOMACH, INTESTINE, &c.

In this account those wounds also are not to be omitted, which are inflicted upon membranous parts, that are situated in the abdomen, and contain some secreted fluid, as on the bladder, either of the bile or urine, the stomach, intestines, receptacle of the chyle, and lacteal vessels. The fluids contained in these parts, when once they are let loose into the cavity of the abdomen, cannot be properly discharged, and therefore easily corrode the internal parts of the body; and the membranes that contained them are generally so fine, that they will not admit of agglutination, especially since no medicine from without can be applied. A few indeed have recovered after slight wounds in these parts; but since the number of these instances is but few, and the cure in them has been accidental, and not performed by the surgeon's art, these may very justly be added to the list of mortal wounds. See ABDOMEN, &c.

2. Many wounds there are which though the experienced surgeon could remedy, yet prove fatal, if neglected, or left to nature: of this number are those which produce instant death, unless relieved by present assistance; such are wounds of the larger external blood-vessels, which might be remedied by ligature, by the application of astringent medicines, or the actual cautery. Of this kind are wounds of the brachial, or crural artery, unless they are too near the trunk of the body; wounds in the large arteries of the cubit, or tibia; of the branches of the external carotid, or temporal artery; to these also may be added wounds of the jugular and other veins, situated upon the external parts of the body; but in these cases no help can be given, unless the surgeon be brought before there has been a vast profusion of blood. See the article CRURAL ARTERY, &c.

3. Wounds are properly said to become mortal by accident, where the patient's death, from them, is occasioned either by the ill conduct of the patient himself, or by the neglect or ignorance of his surgeon; the wound itself being of the number of those deemed curable by the judicious practitioner. Under this head are to be reckoned, 1. Those wounds which the surgeon has neglected to cleanse sufficiently, though he had it in his power to do it; as when some foreign body, which might easily have been extracted, is left in the wound, and produces inflammations, hæmorrhages, convulsions, and finally death itself; so in wounds of the thorax and abdomen, if the surgeon does not use his utmost diligence to evacuate the grumous blood, it will corrupt there, and by drawing the neighbouring parts into consent, will expose the patient to death: great care must also be taken that the lips of the wound do not close till the blood that is collected in the cavity of the body be all evacuated if possible, which will be easily perceived by the difficulty of breathing, and other bad symptoms going off; but if any of the larger internal vessels are wounded, then all attempts to discharge the blood are vain, for the violence of the hæmorrhage takes off the patient. 2. Wounds are also to be accounted mortal by accident, which are treated or searched in too rough a manner by the surgeon; for if wounds are handled roughly, which are full of nervous parts, or of large blood-vessels, there is great danger of bringing on hæmorrhages, convulsions, inflammations, gangrenes, and finally death itself. The case is also the same, 3. in external wounds, which are slight of themselves, but under which the patient is lost by the inflammation, which is increased and brought on by the surgeon's injudicious treatment; or, 4. when any one is taken off by the violence of the hæmorrhage from a wound of the hand or foot; for in this case, the surgeon might easily have stopped the blood by the application of proper remedies, or by ligature; or, 5. when the patient is guilty of any intemperance in eating or drinking, or of any excess of passion, of exposing himself to the cold air, or of using violent exercise. For by these means, wounds, more especially those of the head, by being liable to fresh hæmorrhages, and other dangerous accidents, frequently become mortal, notwithstanding they naturally

would not prove so, and though the surgeon uses his utmost care and skill. 6. Among these also are to be accounted those wounds of the head, where the patient is lost by the vast quantity of blood, which is extravasated in the cavity of the cranium, and confined there; but where he might have been relieved if the trepan had been applied in time; for though wounds of this kind generally prove incurable, yet, as there is at least a possibility of saving a person in these circumstances, by the use of the trepan, this may properly be reckoned among the doubtful cases, and not deemed absolutely mortal. 7. And lastly, a bad habit of body prevents the cure of wounds, which would admit of an easy cure in healthy subjects; so we often see the slightest puncture on the hand or foot of an hydropical, consumptive, or scorbutic person, shall produce a gangrene, and prove mortal; though the surgeon spares no care nor application to prevent it. See the articles GANGRENE, EXTRAVASATION, DROPSY, SCURVY, &c.

Cure of WOUNDS. Since a wound is a solution of the continuity of the parts of the body, the reunion of those parts seems to be the principal intention; but since wounds are of very different kinds, some slight, and others of great consequence, in proportion to this difference, so will the manner of prosecuting this intention differ.

The cure of slight wounds is generally performed with great ease, by applying a small portion of lint to the part, well saturated with spirit of wine, oil of eggs, turpentine, basilicon, the balsam of Arceus, of Peru, &c. securing the dressings with a plaster, and renewing them once in a day or two: by this means, the lips of the wound will presently agglutinate.

Wounds which are attended with some danger, are to be treated as follows: in the first place, the wound is to be cleansed from all extravasated blood, sordes, &c. in the next place, if a bullet, the point of a sword, any part of the clothing, a piece of glass, or any other foreign body, shall remain in the wound, it is to be removed with the fingers, or with proper instruments, as has been already explained under the articles EXTRACTION, and GUN-SHOT WOUNDS. The hæmorrhage is to be stopped at the first dressing; the divided parts are to be brought as near each other as possible,

and their situation is to be so maintained, that the cicatrix which is left may appear even. See the articles HÆMORRHAGE, BANDAGE, and CICATRIX.

Among the number of the most simple wounds are reckoned those which are made by puncture, or stabbing upon the external parts, and not penetrating deep, the method of treating which has been given under the article PUNCTURE.

The method of treating a cut, or such a wound as is made by a cutting instrument, where no part of the flesh is taken off, and the accident happens to the external parts of the body, and does not penetrate deep, after the wound is cleansed, it should be dressed with the same vulnerary balsam, and the lips of the wound should be closed, and kept in that situation. This is done after different methods, according to the difference of the wound. 1. It is to be done by placing the wounded part in a proper posture, that is, as soon as the wound is dressed, the part should be placed in such a situation, that the divided parts may be most likely to keep in constant contact. 2. By a proper bandage, tying up the parts so that the lips may meet, and thereby easily unite. 3. By a proper suture, which differs according to the difference of the wound, but may be generally divided into the dry and bloody suture; the dry, or as some call it, the bastard suture, is the application of sticking plasters, to keep the lips of the wound united; the bloody, or true suture, is performing the same thing with a needle and thread; the nature and method of each of which has been already treated of under the article SUTURE.

If the wound heals by the assistance of the suture, the threads or ligatures are to be cut near the knots; the lower lip of the wound is to be suspended with one hand, while the threads are gently drawn out by the other; the punctures that are left will easily heal by the application of a vulnerary water, called by the french *l'eau d'arquebuse*, or by injecting aqua calcis, or spirit of wine, and laying on compresses, dipped in the same liquors; but larger wounds are to be dressed with the balsam of arcæus, or balsam of capivi, &c. and the lips kept firm together, with some sticking plaster, till a firm cicatrix is formed.

Where there is a loss of substance, the wound will not unite either by the help of plaster, or suture, till it is filled up

with new flesh. For this purpose, you will find lint dipped in oil, or spread with some vulnerary balsam, or ointment, and applied to the bottom of the wound, very serviceable, covering it with a plaster, compress and proper bandages, and this dressing is to be repeated daily. As hot or cold air is very hurtful to wounds, so it must by all means be kept from them, for which reason the surgeon should be careful not to remove the old dressings till the fresh ones are got ready, and to be as expeditious as possible in applying them. After this, when a white, even, thick matter appears in the wound, it should be dressed as you see occasion, every day, or every other day; the superfluous matter should be wiped away with a very light hand; and it is better to leave some behind, than to treat the wound roughly. These rules being observed, the flesh will spring up presently, and the wound unite; and in order to perfect the cure of the wound, an even cicatrix should, if possible, be procured, for the method of obtaining which, see the article PUS, &c.

When any uncleanness or foulness is perceived in a wound, that is, if the flesh is putrid, fungous, black or livid, it must be well cleansed before any attempt is made to heal it, for which purpose apply a digestive ointment, made with turpentine, yolk of eggs, and honey of roses; and where this is not strong enough, substitute the egyptian ointment, or spirit of wine diluted; or if you require more strength, use red precipitate mercury. Applications of this kind are to be continued till the wound is intirely clean; after which, recourse is to be had to the methods already prescribed. If the new flesh should be luxuriant, and rise up so as to prevent the formation of an even cicatrix, it must be taken down with green vitriol, or a powder composed of burnt alum, and red precipitate mercury; at the same time making a proper presure, with the plasters, compresses, and bandages, till the parts are even. See the article FUNGUS.

The patient should observe a strict regimen with regard to his diet and manner of life, as nothing forwards the cure so much as a good habit of body, which may be procured by observing a strict regularity with regard to diet, air, keeping the passions under, and indulging neither too much sleep, nor suffering too great watchfulness; and it is to be observed,

served, that the greater tendency there is in a patient to a diseased state of body, so much the stricter course of life ought he to observe. See the articles DIET, REGIMEN, AIR, SLEEP, WATCHFULNESS, PASSIONS and DISEASE.

The bowels should by all means be kept open, especially in those who have received a wound in the head; however, it is to be observed, that strong cathartic medicines are to be avoided; but it is not only safe but advisable to eat and drink those things that may at the same time nourish and keep the body open. To this end the patient may drink plentifully of tea or coffee, may eat stewed prunes, roasted apples: but hard meats of all kinds are forbid: where the patient is so bound up, that a diet of this kind has no effect, it will be necessary to have recourse to medicines, but then those must be of the mildest kind; here a gentle clyster may be given, a suppository may be used, or an ounce or two of manna, or some purging salts in warm broth may be prescribed: whenever the violence of the wound, or the ill habit of the patient require the use of internal remedies, vulnerary drinks will be found to be of the greatest consequence, in composing which, the constitution of the patient, and the nature of the complaint should be diligently consulted; for if the patient is of a phlegmatic habit of body, cold, pale, or naturally subject to tumours, then the vulnerary decoction should be composed of herbs that attenuate and divide the blood. See ATTENUANTS.

If the patient has a thin sharp blood, then decoctions of viscous and glutinous plants will be proper; but if he is vexed with great pain or wakefulness, then some opiates must be administered. If he should be troubled with an acidity, absorbents are proper; and when a quickness of pulse, and an extraordinary heat are perceived, they are sure signs of a symptomatical fever. See the articles AGGLUTINANTS, OPIATES, ABSORBENTS, and FEVER.

For the disorders accompanying wounds, commonly called the symptoms of wounds, as hæmorrhages, pains, spasms, convulsions, &c. See HÆMORRHAGE, &c.

For wounds in the neck, and wounds in the eyes, see NECK and EYE.

For wounds in the abdomen, intestines, &c. see the articles ABDOMEN, GASTROGRAPHY, INTESTINES.

For wounds of the thorax, see the article THORAX.

For wounds of the head, see the articles SKULL, FISSURE, CONTRA-FISSURE, EXTRAVASATION, CONTUSION, FRACTURE, TREPAN, &c.

For gun-shot wounds, &c. see the article GUN-SHOT wounds, &c.

For the treatment of such wounds as the patient undergoes in the severer operations of surgery, such as lithotomy, trepanning, amputation of a limb, or large tumour, extirpation of the breast, the cæsarean section, &c. See the articles LITHOTOMY, TREPPANNING, &c.

WOUNDS in horses. The most terrible wounds these creatures are subject to, are those got in the field of battle. The farriers that attend camps, have a coarse way of curing these; but it is a very expeditious and effectual one. If the bullet be within reach, they take it out with a pair of forceps; but if it lie too deep to be come at, they leave it behind, and dress up the wound in the same manner as if it were not there. They first drop in some varnish from the end of a feather, and when the bottom is thus wetted with it, they dip a pledget of tow in the same varnish, which they put into the wound, and then cover the whole with the following charge: take a quarter of a pound of powder of bole armenic, half a pound of linseed-oil, and three eggs, shells and all; add to these four ounces of bean-flour, a quart of vinegar, and five ounces of turpentine; this is all to be mixed over the fire, and the wound covered with it. This application is to be continued four or five days; then the tent put into the wound is to be dipped in a mixture of turpentine and hogs-lard; by this means a laudable matter will be discharged, instead of the thin sharp water that was at first. Then the cure is to be completed by dressing it with an ointment made of turpentine, first well washed, and then dissolved in yolks of eggs, and a little saffron added to it.

This is the practice in deep wounds that do not go through the part; but in cases where the bullet has gone quite through, they take a few weaver's linen-thumbs, made very knotty; these they make up into a kind of link, and dipping it in varnish, they draw it through the wound, leaving the ends hanging out at each side; by means of these they move the link or skain three or four times a day, always

always wetting the new part that is to be drawn into the wound with fresh varnish. They put on a charge of the bole armenic, &c. as before described, on each side of the wounded part, and continue this as long as the wound discharges thin watery matter, or the sides continue swelled. After this they dress it with the ointment of turpentine, yolks of eggs, and saffron, till it is perfectly cured.

The other methods are the dressing the wound with an ointment made of wax, turpentine, and lard, and covering it with linen-rags wetted with cream; or the dressing, with a mixture of yolks of eggs, honey, and saffron, and covering it up with cream and baum-leaves beaten together.

When the wound is so dangerous as to require the assistance of internal medicines, they give the following pills: take assa foetida, bay-berries, and native cinabar, of each a pound; beat up the whole into a mass with brandy, and roll it into pills of fourteen drams weight each. These are to be laid in a shady place to dry, after which they will keep ever so long without any damage. The horse is to take two of these every other day, or, if necessary, every day, till he has taken eight or ten of them; and he is to stand bridled two hours before and after the taking of them.

When the wound seems at a stand, not appearing foul, and yet not gathering new flesh, there must be recourse had to the following powder, whose effect in bringing new flesh is wonderful: take dragon's blood and bole-armenic, of each two ounces; mastic, olibanum, and sarcocolla, of each three drams; aloes, round birth-wort, and common iris root, of each one dram and a half; make the whole into a fine powder. This is sometimes used dry, sprinkling it on the wound; but sometimes it is mixed with turpentine, sometimes with juice of wormwood, and sometimes with honey of roses, and either way does very well. When the wound grows foul, and requires a detergent to cleanse it, the common liquor for this purpose is a phagedenic water, which they make of lime-water and sublimate, in this manner: take two pounds and a half of newly made and unslacked lime, put it into a pewter-veffel, and pour on it five quarts of boiling water: when the bubbling is over, let it stand to rest two or three days, stirring it often with a stick, then pour it

clear off, after a due time, for the lime to settle; and filtre it through some whited-brown paper, made for the lining of funnels on this occasion. To a quart of the clear lime-water thus prepared, add eight ounces of spirit of wine, and one ounce of spirit of vitriol; when these are well mixed by shaking them together, then add an ounce of corrosive sublimate in fine powder: mix all well together, and keep the whole in a bottle to be used for the cleansing of these foul wounds, and on any other occasion where there may be a detergent of this powerful kind necessary. It will keep good many years. If this water will not thoroughly cleanse the wound, but there still will remain a quantity of foul matter in it, and there is danger of a gangrene, they add to it as much arsenic, in fine powder, as there was of the corrosive sublimate; that is, at the rate of an ounce to a quart and half a pint.

WRACK, or WRECK. See WRECK.

WRASSE, or OLD WIFE, in ichthyology, a species of labrus, with the rostrum turning upward, and the tail circular at the end. See the article LABRUS.

This is a very beautiful fish; its usual size is about ten inches in length, and considerably thick in proportion; the back-fin has twenty-six rays, fifteen of which are prickly; the pectoral fins have fourteen rays each; the ventral ones only six; the pinna ani has thirteen, and three of these are prickly; the tail is large, and is semicircular at the extremity.

WREATH, in heraldry, a roll of fine linen or silk (like that of a turkish turban) consisting of the colours borne in the escutcheon, placed in an achievement between the helmet and the crest, and immediately supporting the crest. See the article CREST, &c.

WRECK, called also *ship-WRECK*, or *ship-WRACK*, in law, is when a ship perishes on the sea, and no person escapes alive out of it.

In this case, if the ship so perished, or any part thereof, or the goods of the ship come to the land of any lord, and are left there, the lord shall have the same, as being a wreck of the sea; but if any single person, or even a dog, or other living creature, escape alive out of the ship, the party to whom the goods belong, may come within a year and a day, and proving the goods to be his, he shall have them again. And it is held that they are no wrecks, so long as they

remain at sea, within the jurisdiction of the admiralty. The year and day that shall subject the goods to be forfeited, must be computed from the time of seizure; in which time, if the owner of the goods die, his executors or administrators may make proof; but when the goods are bona peritura, the sheriff may sell them within the year, provided he disposes of the same to the best advantage, and accounts for them. In case any goods shipwrecked are seized by any person having no authority to do it, the owner may bring an action against him for so doing. It is enacted by 12 Ann. c. 18. that if any wreck happen by any fault or negligence of master or mariners, the master must make good the loss; but if the same was occasioned by tempest, enemies, &c. he shall be excused: making holes in ships, or doing any thing wilfully tending to the loss thereof, is by that statute declared felony; and by this act justices of the peace are required to command assistance for preserving ships in danger of wreck on the coasts; and officers of men of war, and other ships, are to be aiding and assisting in the preserving such vessels, under the penalty of 100*l*. And, further, no person shall enter such vessel without leave of her commander, or a constable, &c. and persons carrying away goods from such ships, shall pay treble value; but the persons giving assistance, shall be paid by the master a reasonable reward for salvage, &c.

WRECK, in metallurgy, a vessel in which the third washing is given to the ores of metals.

WREN, in ornithology, the chestnut-coloured motacilla, with the wings variegated with white and grey. See the article **MOTACILLA**.

This is a very minute bird; we have not any in Europe that is smaller: the head is large and round, the eyes dark, and the beak slender and brown; the tail is short, and generally carried erect; the head, neck, and back are of a dusky chestnut-brown; the throat is of a palish white colour, the middle of the breast is still whiter, and the lower part of it is variegated with obscure and transverse lines of black. See pl. CCXCVI. fig. 4.

WRESTLING, a kind of combat or engagement between two persons unarmed, body to body, to prove their strength and dexterity, and try which can throw his

opponent to the ground. See the articles **EXERCISE**, **GAMES**, &c.

Wrestling, *palestra*, is an exercise of very great antiquity and fame. It was in use in the heroic age; witness Hercules, who wrestled with Antæus. See the articles **PALÆSTRA** and **GYMNASTICS**. It continued a long time in the highest repute, and had considerable rewards and honours assigned it at the olympic games. It was the custom for the athletes to anoint their bodies with oil, to give the less hold to their antagonist. See the article **ATHLETÆ**, &c.

Lycurgus ordered the spartan maids to wrestle in public, quite naked, in order, as it is observed, to break them of their too much delicacy and niceness, to make them appear more robust, and to familiarize the people, &c. to such nudities.

WREXHAM, a market-town of Denbighshire, in Wales, situated twenty-three miles south-east of St. Asaph.

WRINTON, a market-town of Somersetshire, situated seven miles north of Wells.

WRIST, *carpus*, in anatomy, a part of the hand consisting of eight small, unequal, and irregular bones, all which taken together, represent a sort of grotto of an irregular quadrangular figure, and connected principally with the basis of the radius. Considered in this manner, the whole connection of them has two sides and four edges; one of the sides is convex and external, the other concave and internal. The convexity of the outside is pretty regular and even; but the concavity of the inside has four eminences, one at each corner. One of the four edges touches the fore-arm, and is as it were the head of the carpus; another of the edges touches the metacarpus, and may be called the basis; the third is toward the point of the radius, and the fourth toward the point of the ulna; the first of these latter two may be called the small edge, the latter the larger. See the article **HAND**.

The bones of the carpus are divided into two rows, the first of which lies next the fore-arm, the second next the metacarpus; each row consists of four bones; but the fourth of the first row lies in a manner out of its rank. Each bone has several cartilaginous surfaces for their mutual articulations, and, in some of them, for their articulations with the radius, and bones of the metacarpus and thumb.

running south-east, divides the counties of Radnor and Brecknock; then crossing Herefordshire it turns south, and falls into the mouth of the Severn at Chepstow.

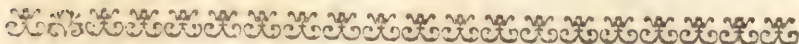
WYKE, antiently signified a farm, hamlet, or little village. See the articles **FARM**, **HAMLET**, and **VILLAGE**.

WYNENDALE, a town of the austrian Netherlands, in the province of Flanders, situated eleven miles south-west of Bruges.

WYTE, or **WITE**, in our antient cus-

toms, a pecuniary penalty or mulct. The Saxons had two kinds of punishments, were and wyte; the first for the more grievous offences. See **WERE**.

The wyte was for the less heinous ones. It was not fixed to any certain sum, but left at liberty to be varied according to the nature of the case. Hence also wyte, or wittree, one of the terms of privilege granted to our sportsmen, signifying a freedom or immunity from fines or amerciaments.



X.

X, or **x**, is the twenty-second letter of our alphabet, and a double consonant. It was not used by the Hebrews or antient Greeks; for as it is a compound letter, the antients, who used great simplicity in their writings, made use of, and expressed, this letter by its component letters *c s*. Neither have the Italians this letter, but express it by *ss*. **X** begins no word in our language, but such as are of greek original, and is in few others, but what are of latin derivation, as *perplex*, *reflexion*, *defluxion*, &c. We often express this found by single letters, as *cks* in *backs*, *necks*; by *ks*, in *books*, *breaks*; by *cs*, in *access*, *accident*; by *ct*, in *action*, *unction*, &c. The English and French pronounce it like *cs* or *ks*; the Spaniards like *c* before *a*, viz. *Alexandro*, as if it were *Alecandro*. In numerals it expresseth **10**, whence in old roman manuscripts it is used for *denarius*; and as such seems to be made of two **V**'s placed one over the other. When a dash is added over it, thus **X̄**, it signifies ten thousand.

XACA, a port-town of Sicily in the province of Mazara, forty miles south of Palermo: east longitude 13° , north latitude 37° .

XALISCO, a city of Mexico, in America, situated near the Pacific ocean, four hundred miles west of the capital city of Mexico: west longitude 110° , and north latitude $22^{\circ} 25'$.

XANSI, a province of China, bounded by the province of Peking on the east, by

the great wall on the north; by the province of Honan on the south, and by the river Crocei, which divides it from the province of Xensi, on the west.

XANTHICA, in antiquity, a macedonian festival, so called because it was observed in the month Xanthus, which, as Suidas tells us, was the same with April. At this time the army was purified by a solemn lustration, in the following manner: they divided a bitch into two halves, one of which, together with the entrails, was placed upon the right hand, the other upon the left; between these the army marched in this order; after the arms of the macedonian kings came the first part of the army; these were followed by the king and his children, after whom went the life-guards, and the rest of the army. This done, the army was divided into two parts, one of which being set in array against the other, there followed a short encounter, in imitation of a fight.

XANTHIUM, the LESSER BUR-DOCK, in botany, a genus of the monocletpentandria class of plants, the compound flower of which is uniform, tubulous, equal, and disposed in the form of a hemisphere; the partial flower is monopetalous, tubulous, funnel-fashioned, erect, and quinquefid; the fruit is a dry, ovate-oblong, bilocular berry, bifid at the apex, hairy, and covered over with hooked prickles; the seed is single, oblong, convex on one side, and plane on the other.

XAN-



XANTUM, a province of China, in Asia, bounded by the Kang sea on the north, by the gulph of Nankin on the east, by the province of Nankin on the south, and by the province of Pekin on the west.

St. XAVIER, a town of the province of La Plata, or Guayra, in South America, situated on the confines of Brasil, two hundred miles west of Rio Janeiro: west long. 50° , south lat. 24° .

XENODOCHUS, an ecclesiastical officer in the greek church, the same with hospitalier; or a person who takes care of the reception and entertainment of strangers.

XENSI, a province of China, bounded by the great wall on the north, by the province of Xanfi on the east, by the province of Suchuen on the south, and by Tibet on the west.

XERANTHEMUM, or **XERANTHEMOLIDES**, the **AUSTRIAN SNEEZE-WORT**, in botany, a genus of the syngenesia-polypetala-superflua class of plants; the compound flower of which is unequal, and consists of many tubulous hermaphrodite floscules placed on the disc, and also a few female tubulated ones on the verge; the seeds are oblong, coronated, and contained in the cup. See plate CCCII. fig. 6.

XEREZ DE LA FRONTIERA, a town of Spain, in the province of Andalusia, twenty miles north of Cadiz.

XEREZ DE GUADIANA, a town of Spain, in the province of Andalusia, situated on the river Guadiana: west long. $8^{\circ} 14'$, north lat. $37^{\circ} 15'$.

XEROPHAGIA, in church-history, the eating of dried foods: so the ancient christians called certain fast-days, on which they eat nothing but bread and salt, and drank only water: sometimes they added pulse, herbs, and fruits. This sort of fasting was observed chiefly in the holy-week, out of devotion, and not by obligation.

XESTA, an attic measure of capacity. See the article **MEASURE**.

XIMENIA, in botany, a genus of plants, the characters of which are not perfectly ascertained: the calyx is a perianthium, composed of three small, cordated, and deciduous leaves; the corolla is formed of a single petal, of a campanulated figure, divided at the edge into three erect, oblong, obtuse segments; the germen is small, and of a suboval figure;

the fruit is an oval drupe, containing one cell; the seed is oval, unilocular, and smooth.

XICHU, a city of China, in the province of Huguam: east longitude 112° , north latitude 27° .

XINYAN, or **CHINIAN**, a city of Asia, in the province of Laotung: east long. 120° , north lat. 31° .

XIPHIAS, the **SWORD-FISH**, in ichthyology, a genus of the acanthopterigios class of fishes. The rostrum, or extremity of the head of the xiphias, is continued forward, with an extremely long point, of a depressed, or somewhat flattened figure, resembling the blade of a sword, and of a bony structure; the lower jaw is acute, and of somewhat a triangular figure; the body is oblong, and of a roundish figure, and is considerably thick in proportion to its length; the back is convex, and the sides are rounded; there are no belly-fins, and on the back there is only one fin, which is long, and lowest in the middle; the pharyngeal membrane, on each side, contains only eight bones. About fifteen feet in length is the size of a moderately large one, but not unfrequently is it met with much bigger. See plate CCCII. fig. 4.

XIPHIAS is also a fiery meteor, in form of a sword. It differs from the acontias in this, that the latter is longer, and more like a dart; and the former shorter and broader in the middle.

XIPHIMUM, in botany, a name given by some to a plant otherwise called iris. See the article **IRIS**.

XIPHOIDES, in anatomy, a cartilage adhering to the sternum; called also cartilago ensiformis. See **STERNUM**.

XUCAR, a river of Spain, which rises in New Castile, and, having run through that province, crosses the province of Valencia, and falls into the Mediterranean, twenty miles south of the city of Valencia.

XYLARIA, in botany, a genus of funguses, consisting of branches or stalks, of a woody structure, tough, firm, and hard, and of an uneven surface. These fungi produce separate male and female flowers: the male flowers consist only of antherae of an oblong figure, supported on very short stamina, and placed only on the upper parts of the plant. The female flowers are lodged in cavities, or cells, in the lower parts of the plant, and

consist of placente, of a roundish figure, and gelatinous substance, to which are affixed great numbers of roundish seeds.

XYLO-ALOES, or ALOE-WOOD, in pharmacy. See the article **ALOE**.

This drug is distinguished into three sorts, the calambac, the common lignum aloes, and calambour.

The calambac, or finest aloes-wood, called by authors *lignum aloes præstantissimum*, and by the Chinese *sukhiang*, is the most resinous of all the woods we are acquainted with: it is of a light spongy texture, very porous, and its pores so filled up with a soft and fragrant resin, that the whole may be pressed and dented by the fingers like wax, or moulded about by chewing in the mouth, in the manner of mastic. This kind, laid on the fire, melts in great parts like resin, and burns away in a few moments, with a bright flame and perfumed smell. Its scent, while in the mass, is very fragrant and agreeable; and its taste acrid and bitterish, but very aromatic and agreeable: it is so variable in its colour, that some have divided it into three kinds, the one variegated with black and purple; the second, with the same black, but with yellowish instead of purple; and the third, yellow alone, like the yolk of an egg: this last is the least scented of the three; the substance, however, in them all, is the same in every respect, except their colour. It is brought from Cochin-china.

The *lignum aloes vulgare* is the second in value. This is of a more dense and compact texture, and consequently less resinous than the other: there is some of it, however, that is spongy, and has the holes filled up with the right resinous matter; and all of it, when good, has veins of the same resin in it. We meet with it in small fragments, which have been cut and split from larger; these are of a tolerably dense texture, in the more solid pieces, and of a dusky brown colour, variegated with resinous black veins. It is in this state very heavy, and less fragrant than in those pieces which shew a multitude of little holes, filled up with the same blackish matter that forms the veins in others. The woody part of these last pieces is somewhat darker than the other, and is not unfrequently purplish, or even blackish. The smell of the common aloes-wood is very agreeable, but not so strongly perfumed as the former.

Its taste is somewhat bitter and acrid, but very aromatic. This wood is also brought from Cochinchina, and sometimes from Sumatra.

The calambour, or, as some write it, calambouc, is also called *agalochum sylvestre*, and *lignum aloes mexicanum*. It is a light and friable wood, of a dusky and often mottled colour, between a dusky green black, and a deep brown. Its smell is fragrant and agreeable, but much less sweet than that of either of the others; and its taste bitterish, but not so much acrid or aromatic as either of the two former. We meet with this very frequent, and in large logs, and these sometimes entire, sometimes only the heart of the tree, the cortical part being separated. This is brought from the island of Timor, and is the aloes-wood used by the cabinet-makers and inlayers.

The Indians use the calambac by way of incense, burning small pieces of it in the temples of their gods; and sometimes their great people burn it in their houses, in times of fasting. It is esteemed a cordial, taken inwardly; and they sometimes give it in disorders of the stomach and bowels, and to destroy worms. A very fragrant oil may be procured from it, by distillation, which is recommended in paralytic cases, from five to fifteen drops. It is at present, however, but little used, and would scarce be met with any where in the shops, but that it is an ingredient in some of the old compositions.

XYLO-BALSAMUM, a name which naturalists give to the wood of the tree which yields that precious gum known to the Latins by the name of *opobalsamum*, and to us by the balm of gilead. See the article **BALSAM**.

We have branches of this tree brought us from Cairo; they are very strait, brittle, unequal, and full of knots; their bark reddish without, and greenish within. The *xylo-balsamum* is reputed good to strengthen the brain and stomach, and to expel poison.

XYLOCASIA, in the materia medica, the same with the *cassia ligna*. See **CASSIA**.

XYLON, the **PRICKLY COTTON-TREE**, in botany, a genus of the polyandriamono-gynia class of plants, the corolla whereof consists of a single petal, divided into five oval, hollow, patent segments; the fruit is a large, oblong, turbinate capsule, formed of five woody valves, and containing five cells; the seeds are roundish,

roundish, and fixed to a columnar pentagonal receptacle, and have a quantity of fine down, or cotton, adhering to them.

XYLON is also a name given to the gossypium. See the articles **GOSSYPIUM** and **COTTON**.

XYLOSTEUM, in botany, a name given by Tournefort to the lonicera of Linnæus. See the article **LONICERA**.

XYNOECIA, in grecian antiquity, an anniversary feast, observed by the Athenians, in honour of Minerva, upon the sixteenth of Hecatombæon, in memory that, by the persuasion of Theseus, they left their country-seats, in which they lay dispersed here and there in Attica, and united together in one body.

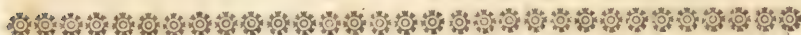
XYRIS, in botany, a genus of the triandria-monogynia class of plants, the flower of which consists of three plain, patent, large, crenated petals, with nar-

row ungues, of the length of the cup; the fruit is a roundish, trilocular, trivalvar capsule, within the cup, with a great number of very small seeds. See plate CCCII. fig. 3.

XYSTARCHA, in antiquity, the master or director of the xystus. In the greek gymnasium, the xystarcha was the second officer, and the gymnasiarcha the first; the former was his lieutenant, and presided over the two xylti, and all exercises of the athleteæ therein.

XYSTUS, among the Greeks, was a long portico, open or covered at the top, where the athleteæ practised wrestling and running: the gladiators, who practised therein, were called xystici.

Among the Romans, the xystus was only an ally, or double row of trees, meeting like an arbour, and forming a shade to walk under.



Y.

Y, or **y**, the twenty-third letter of our alphabet: its sound is formed by expressing the breath with a sudden expansion of the lips from that configuration by which we express the vowel *u*. It is one of the ambigenial letters, being a consonant in the beginning of words, and placed before all vowels, as in *yard*, *yield*, *young*, &c. but before no consonant. At the end of words it is a vowel, and is substituted for the sound of *i*, as in *try*, *descri*, &c. In the middle of words it is not used so frequently as *i* is, unless in words derived from the greek, as in *chyle*, *empyrean*, &c. though it is admitted into the middle of some pure english words, as in *dying*, *flying*, &c. The Romans had no capital of this letter, but used the small one in the middle and last syllables of words, as in *corymbus*, *onyx*, *martyr*. **Y** is also a numeral, signifying 150, or, according to Baronius, 159; and with a dash a-top, as \overline{Y} , it signified 150,000.

YACHT, or **YATCH**, a vessel with one deck, carrying from four to twelve guns. See the article **SHIP**.

YARD, a measure of length used in England and Spain, chiefly to measure cloth, stuffs, &c. See the article **MEASURE**.

YARD, in anatomy. See **PENIS**.

YARD-LAND is taken to signify a certain quantity of land, in some counties being fifteen acres, and in others twenty; in some twenty-four, and in others thirty and forty acres.

YARDS of a ship, are those long pieces of timber which are made a little tapering at each end, and are fitted each athwart its proper mast, with the sails made fast to them, so as to be hoisted up, or lowered down, as occasion serves. They have their names from the masts unto which they belong. As for the length of the main-yard, it is usually five-sixths of the length of the keel, or six sevenths of the length of the main-mast. Their thickness is commonly $\frac{3}{4}$ of an inch for every yard in length. The length of the main-top-yard is two fifths of the main-yard; and the fore-yard four-fifths thereof. The sprit-sail yard, and cross jack-yard are half the mizzen-yard; and the thickness of the mizzen-yard and sprit-sail-yard is half an inch for every yard in length. All small yards are half the great yards from cleat to cleat. When a yard is down a portlark, it gives the length of all top-sail-sheets, lifts, ties, and burnt-lines, as also of the leech-lines and halliards, measuring from the hounds to the deck; and when it is hoisted,

hoisted, it gives the length of clew lines, clew-garnets, braces, tackles, sheets, and bow-lines.

There are several sea-terms relating to the management of the yards; as, square the yards; that is, see that they hang right a-crofs the ship, and no yard-arm traversed more than another: top the yards, that is, make them stand even. To top the main and fore-yards, the clew-lines are, the most proper; but when the top-sails are stowed, then the top-sail-sheets will top them.

YARD-ARM is that half of the yard that is on either side of the mast, when it lies athwart the ship.

YARDS also denotes places belonging to the navy, where the ships of war, &c. are laid up in harbour. There are, belonging to his majesty's navy, six great yards, *viz.* Chatham, Deptford, Woolwich, Portsmouth, Sheerness, and Plymouth; these yards are fitted with several docks, wharfs, lanches, and graving places, for the building, repairing, and cleaning of his majesty's ships; and therein are lodged great quantities of timber, masts, planks, anchors, and other materials: there are also convenient store-houses in each yard, in which are laid up vast quantities of cables, rigging, sails, blocks, and all other sorts of stores, needful for the royal navy.

YARE, among sailors, implies ready or quick: as, be yare at the helm; that is, be quick, ready, and expeditious at the helm. It is sometimes also used for bright by seamen: as, to keep his arms yare; that is, to keep them clean and bright.

YARE, a river of Norfolk, which runs from west to east, through that county, passing by Norwich, and falling into the German sea at Yarmouth.

YARMOU TH, a borough and port-town of Norfolk, situated on the German-sea, at the mouth of the river Yare, twenty miles east of Norwich.

It sends two members to parliament.

YARMOUTH is also a borough-town of the Isle of Wight, in Hampshire, situated on the north-west coast of the Island, six miles west of Newport.

It sends two members to parliament.

YARN, wool or flax, spun into thread, of which they weave cloth. See the articles **CLOTH**, **WOOL**, &c.

Yarn is ordered after the following manner: after it has been spun upon spindles, spools, or the like, they reel it upon reels,

which are hardly two feet in length, and have but two contrary cross-bars, being the best, and the least liable to raveling. In reeling of fine yarn, the better to keep it from raveling, you must, as it is reeled, with a tye-band of big-twist, divide the slipping or skain into several leys, allowing to every ley eighty threads, and twenty leys to every slipping, if the yarn is very fine; otherwise less of both kinds. The yarn being spun, reeled, and in the slippings, the next thing is to scour it. In order to fetch out the spots, it should be laid in lukewarm water for three or four days, each day shifting it once, wringing it out, and laying it in another water of the same nature: then carry it to a well or brook, and rinse it till nothing comes from it but pure clean water: that done, take a bucking-tub, and cover the bottom thereof with very fine ashen ashes; and then having opened and spread the slippings, lay them on those ashes, and put more ashes above, and lay in more slippings, covering them with ashes as before; and thus lay one upon another, till all the yarn be put in: afterwards cover the uppermost yarn with a bucking cloth, and, in proportion to the bigness of the tub, lay therein a peck or two more of ashes: this done, pour upon the uppermost cloth a great deal of warm water, till the tub can receive no more, and let it stand so all night. Next morning you are to set a kettle of clean water on the fire; and when it is warm, pull out the spiggot of the bucking tub, to let the water run out of it, into another clean vessel; as the bucking-tub wastes, fill it up again with the warm water on the fire: and as the water on the fire wastes, so likewise fill that up with the lye that comes from the bucking-tub; ever observing to make the lye hotter and hotter, till it boils: then you must, as before, ply it with the boiling lye at least four hours together, which is called the driving of a buck of yarn.

All this being done, for the whitening of it, you must take off the bucking cloth; then putting the yarn with the lye-ashes into large tubs, with your hands labour the yarn, ashes, and lye pretty well together; afterwards carry it to a well, or river, and rinse it clean; then hang it upon poles in the air all day, and in the evening take the slippings down, and lay them in water all night; the next day hang them up again, and throw water upon them.

them as they dry, observing to turn that side outmost which whitens slowest. After having done this for a week together, put all the yarn again into a bucking-tub, without ashes, covering it as before with a bucking-cloth; lay thereon good store of fresh ashes, and drive that buck, as before, with very strong boiling lye, for half a day, or more; then take it out, and rinse it, hanging it up, as before, in the day-time, to dry, and laying it in water at night, another week: lastly, wash it over in fair water, and so dry it up. Your yarn being thus scoured and whitened, wind it up into round balls of a moderate size. See the article REEL.

Cable-yarn pays, on importation, for the hundred weight 7 s. $3\frac{5}{100}$ d. there is no drawback on exportation. Camel or mohair-yarn pays on importation for the

hundred weight $5\frac{77\frac{1}{2}}{100}$ d. and draws back $5\frac{6\frac{1}{4}}{100}$ d. Cotton-yarn, not of the East-

Indies, on importation, pays per pound $2\frac{87\frac{1}{2}}{100}$ d. and on exportation draws back

$2\frac{58\frac{3}{4}}{100}$ d. Cotton-yarn of the East-Indies, on importation, pays per pound $4\frac{56}{100}$ d.

and on exportation draws back $4\frac{27\frac{1}{2}}{100}$ d.

Grogram-yarn, on importation, pays per pound $6\frac{23}{100}$ d. and on exportation draws

back $6\frac{7\frac{1}{2}}{100}$ d. Irish yarn, in packs con-

taining four hundred weight, at six score pound to the hundred, if by certificate, is free from any duty on importation.

Sail-yarn, on importation, pays per pound $1\frac{43\frac{5}{8}}{100}$ d. and on exportation draws

back $1\frac{29\frac{3}{8}}{100}$ d. For every pound weight

of french, dutch, muscovia, or spruce, and all other raw linen-yarn, there is a duty of 1 d. on importation; and no draw-back on exportation. Wick-yarn on importation, pays, the dozen pound,

2 s. $1\frac{85\frac{1}{2}}{100}$ d. and on exportation draws back 1 s. $11\frac{28\frac{3}{4}}{100}$ d. Woollen or bay-

yarn, on importation, pays the hundred 12 s. 10 d. and on exportation draws back 11 s. 3 d. Worsted-yarn, being

two or more threads twisted or thrown, on importation, pays the pound $2\frac{87\frac{1}{2}}{100}$ d.

and on exportation draws back $2\frac{58\frac{3}{4}}{100}$ d.

YARRINGLE, a kind of instrument, or reel, on which hanks of yarn are wound, to clues or balls. See REEL.

YARUM, a market-town of the north riding of Yorkshire, situated on the river Tees, thirty miles north of York.

YAWNING, *oscitatio*, an involuntary opening of the mouth, occasioned by a vapour or ventosity endeavouring to escape, and generally witnessing an irksome weariness, or an inclination to sleep.

Yawning, according to Boerhaave, is performed by expanding at one and the same time all the muscles capable of spontaneous motion; by greatly extending the lungs; by drawing in gradually and slowly a large quantity of air; and gradually and slowly breathing it out, after it has been retained for some time, and rarified; and then restoring the muscles to their natural state. Hence the effect of yawning is to move, accelerate, and equally distribute all the humours thro' all the vessels of the body, and consequently to qualify the muscles and organs of sensation for their various functions.

Sanctorius observes, that a great deal is insensibly discharged, when nature endeavours to get rid of the retained perspirable matter, by yawning and stretching of the limbs. To these a person is most inclined just after sleep, because, a greater quantity going off by the pores of the skin, than at other times, whensoever a person wakes, the increased contraction that then happens, closes a great deal of the perspirable matter in the cutaneous passages, which will continually give such irritations, as excite yawning and stretching; and such motions, by shaking the membranes of the whole body, and shifting the contacts of their fibres, and the inclosed matter, by degrees throw it off. Hence we see the reason, why healthful, strong people are most inclined to such motions, because they perspire most in time of sleep, and therefore have more of the perspirable matter to lodge in the pores, and greater irritations thereunto.

YAWS, in the sea-language. A ship is said to make yaws, when she does not steer steady, but goes in and out when there is a stiff gale.

YAWS,

YAWS, a distemper endemial to Guinea and the hotter climates in Africa. It makes its first appearance in little spots on the cuticle, not bigger than a pin's point, which increase daily, and become protuberant, like pimples. Soon after, the cuticle frets off, and then, instead of pus or ichor, there appears white sloughs or fordes, under which is a small red fungus. These increase gradually, some to the size of a small wood-strawberry, others to that of a raspberry, others again exceed the largest mulberry, which in shape they very much resemble. In the mean time the black hair growing in the yaws turns to a transparent white. It is not easy to determine the exact time which the yaws take in going through their different stages. Lusty well fed negroes have had several yaws as big as a mulberry in a month's time, whereas the low in flesh, with a scanty allowance have passed three months without their growing to the size of a strawberry. They appear in all parts of the body, but are most plentiful, and of the largest size about the groin, privy parts, anus, armpits, and face: they are largest when fewest in number, and *vice versa*. They are not painful, unless handled roughly, nor cause a loss of appetite. They continue long without any sensible alteration; and some are of opinion, that as soon as the funguses become dry, the infection is exhausted.

The yaws are not dangerous, if the cure is skillfully managed at a proper time. But if the patient has been once salivated, or has taken any quantity of mercury, and his skin once cleared thereby, the cure will be very difficult, if not impracticable. The following form of medicine is recommended as a cure: take of flowers of sulphur, one scruple; of camphor dissolved in spirits of wine, five grains; of theriaca andromachi, one dram; and as much of syrup of saffron as will make a bolus. Let the bolus be taken at going to rest, which must be repeated for a fortnight or three weeks, till the yaws come to the height. Then throw the patient into a gentle salivation, with calomel given in small doses, without farther preparation. After salivation, sweat the patient twice or thrice, on a frame or chair, with spirit of wine, and give the following electuary, *viz.* of æthiops mineral, one ounce and a half, of gum guaiacum, half an ounce; theriaca andromachi, and conserve of red

roses, of each one ounce; oil of saffras, twenty drops; and as much of syrup of saffron as is requisite for an electuary. Of this let two drams be taken in the morning and at night. He may likewise drink the decoction of guaiacum and saffras fermented with molasses, for his constant drink, while the electuary is taking, and a week or a fortnight after the electuary is spent. Sometimes there remains one large yaw, high and knobbed, red and moist; this is called the master-yaw. This must be consumed an eighth or a tenth part of an inch below the skin, with corrosive red mercury, and burnt alum, of each an equal quantity, and digested with one ounce of yellow basilicon, and one dram of red corrosive mercury, and cicatrized with lint pressed out of spirit of wine; and with the vitriol-stone.

YAXLEY, a market-town of Huntingdonshire, twelve miles north of Huntingdon.

YEAR, *annus*, the time the sun takes to go thro' the twelve signs of the zodiac. See the articles ZODIAC and EARTH.

This is properly the natural or tropical year, and contains 365 days, 5 hours, and 49 minutes. As for the gregorian, the civil, the solar or astronomical, the bissextile, and platonic years, see them under the articles GREGORIAN, CIVIL, &c. The julian year derives both its name and institution from Julius Cæsar the dictator; for before his time the form of the roman year was so corrupted by the indiscretion of the pontiffs, in whose hands the power of intercalation was lodged, that the winter-months fell back to the autumn, and those of autumn to the summer. To remedy these inconveniences, the dictator not only added to that year, in which he set about the reformation of the kalendar, the common intercalation of 23 days, between the 23d and 24th days of February, pursuant to Numa Pompilius's institution, but likewise 67 days more between November and December, so that this year contained 445 days. This done, he instituted a solar year of 365 days and 6 hours, pursuant to what he had learned from the Egyptians, and every fourth year he ordered a day to be added. See GREGORIAN, BISSEXTILE, and EMBOLISMIC. The Arabs, Saracens, and Turks count their year by the motion of the moon, making it consist of 12 moons or months, whereof some have 30, and some 29 days, alternately; and these altogether make

354 days, and constitute a common lunar year; and 354 days, 8 hours, 48 minutes, 38 seconds, 12 thirds, constitute what is called a lunar astronomical year. The Greeks counted their year by the motion of both sun and moon; and finding that there was 11 days difference between the lunar and solar years, at first they added an intercalary month every two years, containing 22 days. Afterwards considering the 6 hours also, they put their embolism off 4 years, and then making the three first years to contain three hundred and fifty-four days each, this made the fourth year to have 399 days: and to make this intercalation the more remarkable, they instituted the olympic games on every such fourth year, whence came the computation by olympiads. See the article OLYMPIAD.

The Egyptians had two sorts of years, the erratic and the fixed, or ætiac; the erratic was called the nabonassarean, from the epocha which takes its rise from Nabonassar king of the Chaldees. As it neglects the 6 hours, which in the julian form make a leap day once in four years, its beginning anticipates the julian every fourth year by a day, and therefore it is justly called erratic. The anticipation of one day in four years gains of the julian years one in 1460, so that 1461 nabonassarean years make but 1460 julian years. The fixed Egyptian year observes the julian form of 365 days and 6 hours, making a leap day of the six hours once in four years. It differs from the julian in this, that its months are the same with those of the nabonassarean, that it begins on Aug. 29, instead of January 1; or on Aug. 30, if it be a leap-year; that it takes in the leap-day, not in February, but at the end of the year. See the articles EPOCHA and INTERCALARY.

The persian erratic year goes by the name yezdegerdic, by reason that the persian epocha commences from the death of Yezdegerd, the last persian king, who was killed by the Saracens. It consists of twelve months, containing thirty days each, and five supernumerary ones; so that it differs from the nabonassarean only in the names of the months, and the commencement of the epocha. See MONTH. The gelaean year, used also by the Persians, is very well adapted to the solar motions. It takes in a leap-day every fourth year, but every sixth or seventh turn it throws it forward to the fifth year, by which means the equinoxes and solstices are fix-

ed to almost the same days of the months. The syriac year consists of 365 days and 6 hours, being divided into 12 months of equal extent with those of the julian year, to which they correspond: this year begins October 1, so that the month called Tishrim agrees with our October. The astronomical year is two-fold, viz. the tropical and sidereal: by the latter is meant that space of time which the sun takes in departing from a fixed star, and returning to the same again. This year consists of 365 days, 6 hours, and 10 minutes.

As the form of the year is various among different nations, so likewise is the beginning: the Jews began their ecclesiastical year with the new moon of that month whose full moon happens next after the vernal equinox; and every seventh year they kept as a sabbatic year, during which they let their land lie at rest. The antient jewish year was made to agree with the solar year, by the adding of 11, and sometimes of 12 days, at the end of the year, or by an embolismic month. The beginning of the athenian or attic year was reckoned from that new moon, the full moon of which comes next after the summer solstice. The macedonian lunar year agrees with the athenian, excepting that the former takes its beginning, not from the summer-solstice, but from the autumnal equinox. The ethiopic year is a solar year, agreeing with the ætiac or fixed egyptian year, except in this, that the names of the months are different, and that it commences, with the egyptian year, on Aug. 29, of the julian year. The arabian or mahometan year is called also that of the hegira, because the calculation of these years runs from the epocha of the hegira, when Mahomet fled from Mecca to Medina: they had twelve civil months in a year, which contained 29 and 30 days, by turns, abating for their leap-years, in which the month Dulheggia has always 30. See HEGIRA.

The Mahometans begin their year when the sun enters aries; the Persians, in the month answering to our June; the Chinese, and most of the Indians, begin it with the first moon in March: at Rome there are two ways of computing the year, the one beginning at the nativity of our Lord, which the notaries use; the other in March, on occasion of the incarnation, and it is from this the bulls are dated. The civil or legal year, in England, as well as the historical year, commences Jan. 1, by the

late act for the alteration of the style: the church, as to her solemn service, begins the year on the first Sunday in Advent, which is always that next St. Andrews's day.

YEAR AND DAY, in law, signifies a certain time that by law determines a right, or works prescription in divers cases; as in the case of an estray, if the owner do not challenge it within that time, it becomes forfeited to the lord; so of a wreck, &c. The like time is given to prosecute appeals in; and where a person wounded, dies in a year and a day after the wound received, it makes the offender guilty of murder. See **ESTRAY**, &c. There is also year and day and waste, which is taken to be part of the king's prerogative, whereby he challenges the profits of the lands and tenements for a year and a day, of those that are attainted of petty treason or felony; and the king may cause waste to be made on the lands, &c. by destroying the houses, ploughing up the meadows and pastures, rooting up the woods, &c. unless the lord of the fee agrees with him for the redemption of such waste.

YEAR, in hunting, signifies to bark as beagles properly do at their prey.

YELLOW, one of the original colours of light. See **COLOUR** and **LIGHT**.

YELLOW, in dying, is one of the five simple and mother colours. See the articles **COLOUR** and **DYING**.

For the finest yellows, they first boil the cloth or stuff in alum or pot-ashes, and give the colour with weld or wold.

Likewise turmeric gives a good yellow, though not the best.

There is also an indian wood, that gives a yellow colour bordering on gold. There is another sort of yellow, made of saffron; but this is inferior to them all.

With yellow, red of madder, and that of goat's hair prepared with madder, are made the gold yellow, aurora, thought-colour, macarate, isabella, chamoise-colour, which are all casts or shades of yellow. Painters or enamellers make their yellow of masticote, which is cerus raised to a yellow colour by the fire, or with oker. Limners and colourers make it with saffron, french berries, orcanette, &c. Mr. Boyle tells us a most beautiful yellow may be procured by taking good quicksilver, and three or four times its weight of oil of vitriol, and drawing off, in a glass retort, the saline menstruum from the metalline liquor, till there remains a dry, snow white calx at the bottom; on

pouring a large quantity of fair water on this, the colour changes to an excellent light yellow.

He says, he fears this colour is too costly to be used by painters: and he does not know how it would agree with every pigment, especially oil-colours.

YELLOWS, a disease in a horse, much the same with that called the jaundice in man. See the article **JAUNDICE**.

There are two kinds of it, the yellow and the black. The yellow is a very frequent disorder, say the farriers, arising from obstructions in the gall-pipe, or the little ducts opening into the same, occasioned by viscid or gritty matter lodged therein, or a plenitude and compression of the neighbouring blood-vessels, by means whereof the matter that should be turned into gall, is taken up by the vein, and carried into the mass of blood, which it tinctures yellow, so that the eyes, inside of the lips, and other parts of the mouth capable of shewing the colour, appear yellow. The effect whereof is, that a horse will be dull, heavy, and low-spirited, easily jaded by the least labour or exercise, &c. The black is known by other symptoms: the whites of the eyes, mouth, and lips turn to a dusky colour, and not so clear and sanguine as before. For the cure of this disease, we are directed to dissolve an ounce of mithridate in a quart of ale, or beer, and to give it the horse lukewarm; or instead of mithridate, two ounces of venice-treacle; and if that is not to be had, three spoonfuls of common treacle.

This distemper is also incident to black cattle. The cure is, to bleed them in the ears, eyes, and in the tail; to put salt into their ears, and to rub them between your hands: and being bled, give them two handfuls of salt down their throats, dry over night. In the morning let them have fenugreek, turmeric, long-pepper, annise-seed, and liquorice, but two penny-worth in all, made into a powder, and given in a quart of ale milk-warm.

YELLOW-HAMMER, in ornithology, a species of frangilla, with a yellow head and a greyish yellow body. See the article **FRANGILLA**.

This is somewhat larger than the common sparrow, and is an extremely beautiful bird: the head is large, the eyes have a hazel coloured iris, the ears are patulous, the beak is robust and conic, and the sides of the under chap of it are

compressed, and of a singular form; the throat and belly is yellow, the breast has a redish tinge mixed with that colour, the shoulders are of a mixed green and grey, and the feathers which cover the body are black in their middle, but their edges have a tinge of green.

YEOMAN, the first or highest degree among the plebeians of England, next in order to the gentry. See the articles **GENTLEMAN** and **COMMONS**.

The yeomen are properly freeholders, who having land of their own, live on good husbandry.

YEOMAN is also a title of office in the king's household, of a middle place or rank between an usher and a groom. See the articles **USHER** and **GROOM**.

YEOMAN of the guard were antiently two hundred and fifty men of the best rank under gentry, and of larger stature than ordinary, each being required to be six feet high.

At present there are but one hundred yeomen in constant duty, and seventy more not in duty; and as any of the hundred dies, his place is supplied out of the seventy.

They go dressed after the manner of king Henry VIII's time. They formerly had diet as well as wages, when in waiting, but this was taken off in the reign of queen Anne.

YEOVIL, a market-town of Somersetshire, situated eighteen miles south of Wells.

YERKING, in the manege, is when a horse strikes with his hind-legs, or flings and kicks back with his whole hind quarters, stretching out the two legs nearly together, and even to their full extent. See the article **AIR** and **LEAP**.

YEST, **YEAST**, or **BARM**, a head, or scum rising upon beer or ale, while working or fermenting in the vat. See **BREWING**, **MALT LIQUORS**, &c.

It is used for a leaven or ferment in the baking of bread, as serving to swell or puff it up very considerably in a little time, and to make it much lighter, softer, and more delicate. When there is too much of it, it renders the bread bitter. See the articles **BAKING** and **BREAD**.

The faculty of medicine of Paris, by a decree of March 24, 1688, solemnly maintained it noxious to the health of the people: yet could not that prevent its progress.

YEW, *taxus*, in botany. See **TAXUS**.

YEW, is also a term used by the salt-workers of Limington, and some other parts of

England, to express the first rising of a scum upon the brine in boiling.

In the places where they use this term, they add no clarifying mixtures to the brine, for it ferments in the cisterns, and all its foulness sinks to the bottom, in form of a thin mud; they admit only the clear liquor into the pan, and boil this briskly till it yews, that is, till a thin skin of salt appears upon its surface; they then damp the fire, and carefully skim off this film, and clear only the scratch, or calcareous earth, which separates to the bottom.

They do not collect this into scratch-pans, as at many of the other works, but they rake it up to one side of the pan, and take it out; they then add a piece of butter, and continue the fire moderately strong till the salt is granulated. They keep a brisker fire on this occasion at Limington than in most of the other works, so that they will work three pans in twenty-four hours. See the article **SALT**.

YIELD, or **SLACK the band**, in the manege, is to slack the bridle, and give the horse head. See the article **SLACK**.

YLA, one of the western illands of Scotland situated in the Irish-sea, west of Cantire.

YNCA, or **INCA**, an appellation antiently given to the kings of Peru, and the princes of their blood; the word literally signifying lord, king, emperor, and royal blood.

YOAK, or **YOKE**, in agriculture, a frame of wood, fitted over the necks of oxen, whereby they are coupled together, and harnessed to the plough. See **PLOUGH**. It consists of several parts, as the yoke, properly so called, which is a thick piece of wood, lying over the neck; the bow, which compasses the neck about; the stichings and wreathings, which hold the bow fast in the yoke; and the yoke-ring and ox-chain.

The Romans made the enemies they subdued, pass under the yoke, which they called *sub jugum mittere*, that is, they made them pass under a sort of *furca patibulares*, or gallows, consisting of a pike, or other weapon, laid across two others, planted upright, in the ground. See the article **FURCA**.

YOAK of Land, *jugata terra*, in our antient customs, was the space which a yoke of oxen, that is, two oxen, may plow in one day. See **HYDE** and **YARD-LAND**.

Sea-YOAK. When the sea is so rough, that the helm cannot be governed by the hands, the seamen make a yoak to steer by, that is, they fix two blocks to the end of the helm,

dioecia-pentandria class of plants; the calyx of the male-flower is formed of three leaves; the corolla is formed of a single petal, divided into five parts. The calyx of the female-flower is also composed of three leaves, and the corolla formed of a single petal, divided into five segments; the fruit is a long, very large, truncated berry, attenuated at the base; it contains three cells, placed under the receptacle: there are two plane-oblongo-roundish seeds in each cell.

ZANONIA, in botany, is also Plumier's name for the commelina of Linnæus. See the article **COMMELINA**.

ZANTE, an island in the Mediterranean-sea, situated east long. $21^{\circ} 30'$, north lat. $37^{\circ} 50'$, being about twenty-four miles long, and twelve broad. The chief town is Zant, and is situated on the east side of the island, being well fortified and defended by a castle.

ZAPATA, or **SAPATA**, a kind of feast or ceremony held in Italy, in the courts of certain princes, on St. Nicholas's day; wherein people hide presents in the shoes or slippers of those they would do honour to, in such a manner as may surprise them on the morrow, when they come to dress; being done in imitation of the practice of St. Nicholas, who used, in the night-time, to throw purses of money in at the windows, to marry poor maids withal.

ZARA, a city of Dalmatia, situated on the gulph of Venice: east longitude 17° , north latitude 44° .

ZARNICH, in natural history, the name of a genus of fossils; the characters of which are these: they are inflammable substances, not composed of plates or flakes, but of a plain, simple, and uniform structure, not flexile nor elastic, soluble in ore, and burning with a whitish flame, and noxious smell like garlic. Of this genus there are four known species: 1. A red one, which is the true sandarach. See the article **SANDARACH**. 2. A yellow one found in great abundance in the mines of Germany, and frequently brought over to us among, and under the name of, orpiment. 3. A greenish one, very common in the mines of Germany, and sold in our colour-shops under the name of a coarse orpiment. This is also found in our own country among the tin mines of Cornwall. And, 4. A whitish one, a very remarkable substance, which has the property of turning black ink into a fine florid red. This is

common in the mines of Germany, but is of little value. See **ORPIMENT**.

ZARNAW, a city of Poland, in the province of little Poland and palatinate of Sandomir, situated east long. 20° , north lat. $51^{\circ} 30'$.

ZATMAR, a town of Hungary, situated forty-five miles east of Tockay.

ZATOR, a town of Poland, situated on the river Vistula, fourteen miles west of Cracow.

ZEA, **INDIAN CORN**, in botany, a genus of the monoecia triandria class of plants. In the male flower the calyx is a biflorous glume, and has no aristæ, or awns; the corolla is also a glume without awns. In the female flower the calyx is a glume formed of two valves; the corolla is also a glume formed of two valves; the style is simple, filiform, and pendulous; the seeds are single, and are immersed in a long receptacle.

ZEAL, **ΖΗΛΟΣ**, the exercise of a warm animated affection, or passion, for any thing. See the article **PASSION**.

The greek philosophers make three species of zeal. The first of envy, the second of emulation or imitation, the third of piety or devotion, which last makes what the divines call a religious zeal. See **ENVY** and **EMULATION**.

ZEALAND, the chief of the danish islands, is situated at the entrance of the Baltic-sea, bounded by the Schagerrack-sea, on the north; by the Sound, which separates it from Schonen, on the east; by the Baltic-sea, on the south; and by the strait called the Great Belt, which separates it from the island of Funen, on the west; being of a round figure, near two hundred miles in circumference: the chief town is Copenhagen.

ZEALAND, is also a province of the United Netherlands, consisting of eight islands, which lie in the mouth of the river Scheld, bounded by the province of Holland, from which they are separated by a narrow channel, on the north; by Brabant, on the east; by Flanders, from which they are separated by one of the branches of the Scheld, on the south; and by the German-ocean, on the west.

ZEALOTS, an ancient sect of the Jews, so called from their pretended zeal for God's laws, and the honour of religion. The zealots were a most outrageous and ungovernable people; and on pretence of asserting God's laws, and the strictness and purity of religion, assumed a liberty of questioning notorious offenders without

without staying for the ordinary formalities of law. Nay, when they thought fit, they executed capital punishments upon them with their own hands. They looked upon themselves as the true successors of Phineas, who out of a great zeal for the honour of God, did immediate execution upon Zimri and Cozbi; which action was so pleasing to God, that he made with him and his seed after him the covenant of an everlasting priesthood.

ZEBLICUM *marmor*, in natural history, a name given by several authors to a soft green marble variegated with black and white; and though the authors who have described it have not observed it, yet it no way differs from the white ophites of the antients. See the articles **MARBLE** and **OPHITES**.

ZEBRA, the **WILD ASS**, in zoology, a species of equus, transversely striated. See the articles **HORSE** and **ASS**.

This is an extremely beautiful animal, and though in colouring so much different from all other kinds and varieties of equus, agrees with it in all other respects: it is about equal to the common ass in size, but of a much more elegant figure; the head is small and short, the ears are long, the eyes are large and bright, and the mouth considerably large; the neck is long and slender, but elegantly turned; the body is rounded, and small in comparison of that of the common ass; the legs are long and slender, the tail long and beautiful, but hairy only at the end. See plate CCCII. fig. 1.

The whole animal is party-coloured, or beautifully striped in a transverse direction, with long and broad streaks, alternately of a deep, glossy, and shining brownish and whitish, with some absolutely black. It is a native of many parts of the East.

ZECHARIAH, a canonical book of the Old Testament, containing the predictions of Zechariah, the son of Barachia, and grandson of Iddo. He is the eleventh of the twelve lesser prophets. Zechariah entered upon the prophetic office at the same time with Haggai, and was sent to the Jews upon the same message, to reprove them for their backwardness in erecting the temple, and restoring divine worship; but especially for the disorder of their lives and manners, which could not but derive a curse upon them. By several notable visions and types, he endeavours to confirm their faith, and establish their assurance concerning God's

providence with them, and care over them; and as a proof and demonstration of this, he interperes the most comfortable promises of the coming of the kingdom, the temple, the priesthood, the victory, the glory of Christ the branch. Nor does he forget to assure them of the ruin of Babylon, their most implacable enemy. This prophet is the longest and most obscure of all the lesser prophets, his style being interrupted and without connection.

ZEDOARY, in the materia medica, a root, the several pieces of which differ so much from one another in shape, that they have been divided into two kinds, as if two different things, under the names of the long and round zedoary, being only the several parts of the same root.

The long pieces of zedoary are of a very singular figure; they are not of the nature of the common long roots of plants, but are, themselves, properly tubera or glandules, as well as the round ones, differing from them in nothing but their oblong figure: they are two, three, or four inches in length, and of the thickness of a man's finger; not large at one end and tapering away to the other, but thickest in the middle, and growing gradually smaller to each end, where they terminate in an obtuse point each way: they are of a tolerable smooth surface, except that they have some little protuberances in several parts from which fibres have originally grown: they are of a very close and compact texture, considerably heavy, and very hard; they will not cut easily with a knife; when cut, they shew a fine, smooth, and glossy surface; they are of a pale greyish colour on the outside, with a faint mixture of brown in it, and are of dead whitish hue within: they are not easily powdered in the mortar; their smell, while bruising, is very remarkable, and is highly aromatic, and of a bitterish taste. The round zedoary has all the same characters with this, and differs only in figure, being short and roundish, of the size of a small walnut, smooth on the surface, except where the bundles of fibres have adhered, and generally running into a sharp point at the end.

Zedoary is to be chosen fresh, sound, and hard, in large pieces; it matters not as to shape, whether long or round; of a smooth surface, and of a sort of fatty appearance within, too hard to be bitten
by

by the teeth, and of the briskest smell that may be; such as is friable, dusty, and worm-eaten, is to be rejected.

The antient Greeks were wholly unacquainted with zedoary; there is no mention of any such drug in the works of Dioscorides or Galen. The Arabians, however, were well acquainted with it; they mention it sometimes under the name of zedoary, and sometimes under that of zerumbeth, but are so short in their descriptions, and so at variance among one another, that it is not easy to ascertain their meaning, as to the distinction, if they originally meant any, between the substances expressed by these two names.

Serapio and Rhazes use the words zedoaria and zerumbeth as synonymous, and declare both to mean only the same root. Avicenna, on the contrary, distinguishes the zedoary and zerumbeth, and even talks of two kinds of zedoary. Others of them make the zarnab they speak of different both from the zedoary and zerumbeth; but Serapio, an author as much to be depended upon for his accuracy as any of them, declares zedoary, zerumbeth, and zarnab, all to be the same thing.

Zedoary, both of the long and round kind, is brought us from China; and we find by the Arabians, that they also had it from the same place. The round tubera are less frequent than the long, and some of them have, therefore, supposed them the produce of a different and more rare plant; but this is not so probable as that the general form of the root is long, and the round tubera are only *lusus naturæ*, and less frequent in it.

The plant which produces it, is one of the class of the herbæ bulbosæ affines of Mr. Ray. It is described, in the Hortus Malabaricus, under the name of the malan kua. Zedoary, distilled with common water, affords a thick and dense essential oil, which soon concretes of itself into a kind of camphor, and on this oil its virtues principally depend. It is a sudorific, and is much recommended by some in fevers, especially of the malignant kinds. It is also given with success as an expectorant in all disorders of the breast, arising from a tough phlegm, which it powerfully incises and attenuates; it is also good against flatulences, and in the cholick; it strengthens the stomach, and assists digestion; and,

finally, is given with success in nervous cases of all kinds. It is not an ingredient in any of our shop-compositions. It was in the Philonium Romanum of the late London Dispensatory, but it is now omitted in the Philonium Londinense of this: in extemporaneous prescriptions it is seldom given singly, but is a common ingredient in restorative powders and infusions. Its dose is from five to ten grains in powder, and from a drachm to two drachms to the point in infusion.

ZEIGINHEIM, a town of Germany, in the landgraviate of Hesse-Cassel, situated thirty miles south of Hesse-Cassel city.

ZEITS, a town of Germany, in the circle of Upper Saxony, situated twenty-four miles south-west of Leipzig.

ZELL, a city of Germany, in the circle of Lower Saxony, capital of the dutchies of Zell and Lunenburg, situated at the confluence of the rivers Aller and Fuhse, thirty miles north of Hanover, and forty south of Lunenburg: east longitude 10° , north latitude $52^{\circ} 52'$.

ZEMBLA NOVA. See **NOVA-ZEMBLA**.

ZEND, or **ZENDAVESTA**, a book containing the religion of the magians, or worshippers of fire, who were disciples of the famous Zoroaster. See **MAGI**.

This book was composed by Zoroaster during his retirement in a cave, and contained all the pretended revelations of that impostor. The first part contains the liturgy of the magi, which is used among them in all their oratories and fire-temples to this day; they reverence it as the christians do the Bible, and the mahometans the Koran. There are found many things in the zend taken out of the scriptures of the Old Testament, which Dr. Prideaux thinks is an argument that Zoroaster was originally a Jew. Great part of the Psalms of David are inserted: he makes Adam and Eve to have been the first parents of mankind, and gives the same history of the creation and deluge as Moses does, and commands the same observances about clean and unclean beasts, the same law of paying tythes to the sacerdotal order, with many other institutions of jewish extraction. The rest of its contents are an historical account of the life, actions, and prophecies of its author, with rules and exhortations to moral living. The mahometans have a sect which they call zendikites, who are said to be the sadducees of mahometanism, denying providence

dence and the resurrection, believing the transmigration of souls, and following the zend of the magi.

ZENITH, in astronomy, the vertical point; or a point in the heavens directly over our heads. See the articles **NADIR**, **VERTEX**, and **VERTICAL**.

The zenith is called the pole of the horizon, because it is ninety degrees distant from every point of that circle. See the articles **POLE** and **HORIZON**.

ZENITH-DISTANCE, is the complement of the meridian altitude of any heavenly object; or it is the remainder, when the meridian altitude is subtracted from ninety degrees. See the articles **COMPLEMENT** and **ALTITUDE**.

ZENSUS, in arithmetic, a name given to a square number, or the second power, by some authors. See **SQUARE** and **POWER**.

ZEPHANIAH, a canonical book of the Old Testament, containing the predictions of Zephaniah the son of Cushi, and grandson of Gedaliah; being the ninth of the twelve lesser prophets. He prophesied in the time of king Josiah, a little after the captivity of the ten tribes, and before that of Judah; so that he was contemporary with Jeremiah. He freely publishes to the Jews, that what increased the divine wrath against them, was their contempt of God's service, their apostacy, their treachery, their idolatry, their violence and rapine, and other enormities: such high provocations as these, rendered their destruction terrible, universal, and unavoidable: and then, as most of the prophets do, he mingles exhortations with repentance, as the only expedient in these circumstances.

ZEPHYR, *zephyrus*, the west wind; or that which blows from the cardinal point of the horizon opposite to the east. See **WIND**, **WEST**, and **COMPASS**.

ZEST, the woody thick skin, quartering the kernel of a walnut; prescribed by some physicians, when dried and taken with white-wine, as a remedy against the gravel.

Zest is also used for a chip of orange or lemon-peel; such as is usually squeezed into ale, wine, &c. to give it a flavour; or the fine ethereal oil which spurts out of that peel on squeezing it.

ZETETIC METHOD, in mathematics, the method made use of to investigate or solve a problem.

ZEUGMA, a figure in grammar, whereby an adjective or verb which agrees with a

nearer word, is also, by way of supplement, referred to another more remote.

ZEUS, in ichthyology, a genus of the acanthopterygious order of fishes, the characters of which are as follow: the body is is very broad, thin, and compressed; the scales are rough; there is only one fin on the back, but it is very long, and cut in so deeply near the anterior part, that it appears to be two fins; the branchiostege membranes do not consist of parallel bones, as in other fish, but have a number of ossicles of various figures, some of them placed longitudinally, some transversely, and some obliquely.

To this genus belong the doree, the indian doree, and the aper or riondo. See the articles **DOREE** and **RIONDO**.

ZIBETHICUS, **ZIBETHICUM ANIMAL**, the **CIVET CAT**, in zoology, the grey meles, with uniform claws. See the article **MELES**.

It was long before the form of this creature, to whom we owe the civet, was known, and long after this before it could be determined to what genus of quadrupeds it belonged: it was first supposed of the cat, and afterwards of the dog-kind; but it is truly one of the badger species. It is a large and fierce animal; (See plate CCCII. fig. 2.) its size is that of the common badger, but its body is not so bulky; the head is large, oblong, and considerably thick; the fore-head is depressed; the snout is rounded and thick; the nose turns up a little; the mouth is wide, and is furnished in a very formidable manner, with teeth; and there are a few rigid but very long whiskers placed about it; the eyes are small, the ears large, obtuse, and patulous; the neck is long, rigid, and thick; the tail long, and resembling that of the common cat; it is covered with hair, and there runs a ridge of the same hair all along the top of the back. The whole animal is of a light silvery colour, variegated in a beautiful manner, with large spots of black; the legs are very robust, almost intirely black, the feet are armed with very long and sharp claws; under the tail is situated the bag, in which is contained the perfume we call civet; and its situation is the same with that which contains the white sebaceous matter in the badger. See **BADGER** and **CIVET**.

ZIBETHUM, *civet*. See **CIVET**.

ZIMENT WATER, or **COPPER-WATER**, in natural history, the name by which some have called water found in places

where there are copper-mines, and lightly impregnated with particles of that metal. See COPPER and VITRIOL. The most famous spring of this kind is about a mile distant from Newfol, in Hungary, in a great copper-mine, where the water is found at different depths, and is received into different basons, for the purpose of separating the copper from it. In some of these it is much more highly sated with this metal than in others, and will make the supposed change of iron into that metal much sooner. The most common pieces of iron used in the experiments, are horse-shoes, nails, and the like; they are found very little altered in shape after the operation, except that their surfaces are more raised. The water which performs this wonderful operation appears greenish in the basons where it stands; but if a glass of it be taken up, it looks clear as crystal; it has no smell, but has a very strong vitriolic and astringent taste, in-somuch, that the lips and tongue are blistered and scorched on tasting it. The miners use this water as a medicine; and whatever sickness they are seized with, they first attempt its cure by large doses of the water, which usually both vomits and purges them briskly; they also use it in disorders of the eyes. The copper produced from these waters is valued by the people much beyond any other copper, as being more ductile, and running easier in the fire. And from the several experiments made upon the water, the true nature of it may be easily understood. It contains a large quantity of the vitriol of copper, which it probably owes to a solution of that metal, by means of the acid of the common pyrites and water. When this is known the effects are not difficult to be accounted for; there being no real change of one metal into another, but the true state of the case being that the particles of one metal are dissolved and carried away, and those of another metal deposited in their place; a water thus impregnated is a menstruum capable of dissolving iron, and in the solution of that metal becomes so weakened as to let go the copper it before contained in small parcels.

ZINC, or ZINK. See the article ZINK.

ZINGIBER, or ZINZIBER, *ginger*, in botany and pharmacy, &c. See the article ZINZIBER and GINGER.

ZINK, or ZINC, or ZINCK, in natural history, the name of a very remarkable fossil substance, resembling bismuth in appearance, but of a bluer colour. See the article BISMUTH.

It is a very remarkable mineral, and one that has never been well understood as to its origin, till of late; for though the world well knew of a long time both zink and lapis calaminaris, and knew that both of them had the remarkable property of turning copper into brass, which one would think might have given a hint to the discovery of a natural alliance between them; yet have they been ever treated of as two different substances, by the writers on these subjects; and Dr. Lawson was the first who ever publicly declared, and proved, lapis calaminaris to be the ore of zink. See the article CALAMINARIS *Lapis*.

Zink is generally confounded with bismuth, though in reality a very different body; but the regulus of these two minerals having a very great external resemblance, the vulgar have not distinguished them; and hence we hear of many ores of zink in the less accurate writers, all which are truly the ores of bismuth.

The lapis calaminaris is the true and general ore of zink, yet that mineral is not confined to this ore alone, but is mixed in great abundance in its disseminated particles among the matter of the ores of other metals, particularly of lead.

Our artificers have long been acquainted with zink, under the name of spelter; but none of them till of late have ever been able to make any guess as to its origin. We have much zink brought to us from the East-Indies, under the name of tutenag; yet no body ever knew from what, or how it was produced there; and all that was heretofore known of it was, that among that strange mixture of ores which the great mines yields at Gosselaer in Saxony, when they were fused for other metals, a large quantity of zink was produced; but Dr. Lawson observing, that the flowers of zink and of lapis calaminaris were the same, and that their effects on copper were the same, never ceased his inquiries till he found the method of separating zink from it.

The pure zink is a solid metal-like body, of a bluish white, and somewhat less brittle than bismuth, especially when gently

gently heated, and most, of all the metallic minerals, approaches to malleability: it melts in a very small fire, and in a strong one takes fire, burning with a bluish-green flame, and subliming into white flowers, which are with difficulty reducible again into the form of zink: in an open fierce fire, it wholly flies off in vapour.

There is great reason to believe, that all the zink or tutenag brought from the East-Indies, is procured from calamine; and we have now on foot at home, a work established by the discoverer of this ore, which will probably make it very soon unnecessary to bring any zink into England, as we have great plenty of the calamine.

The manner of extracting zink from the lapis calaminaris, is this: the lapis calaminaris must be finely pulverized, and well mixed with an eighth part of charcoal-dust, and put into a close retort to prevent the access of the air, which would inflame the zink as it rises. The retort is to be placed on a violent fire, sufficient to melt copper. After some time the zink rises, and appears in the form of metallic drops within the neck of the retort. When the vessel is cool, it must be taken out, by breaking off the neck of the retort.

Flowers of ZINK. The flowers of zink are a substance famous in the writings of the chemists, who have led their followers into a thousand errors by the names by which they have called them.

Some have called them talc, and a solution of them in vinegar, oil of talc; to which they have attributed very extraordinary qualities. Some have set the ignorant upon a fruitless attempt of extracting an oil from venetian talc, to do all the things they have commemorated of this oil. Others have called these flowers the sericum; others the aqua sicca philosophorum; and others the philosophic cotton.

The most simple and easy way of obtaining the flowers of zink pure and white, is this: melt the zink in a tall crucible inclined in the furnace in an angle of 45 degrees, or thereabouts; let the fire be moderate, little stronger than would be necessary for the melting of lead. If the zink is left in this state without being stirred, it forms a grey crust upon its surface, and becomes calcined by degrees under it into a granulose white substance; but to have the flowers, the

matter must be stirred from time to time with an iron rod, and this crust broken as often as it arises; there will then, after some time, appear a bright white flame, and about two inches above it there will be found a very thick smok, and with this there will arise a quantity of very white flowers, which will fix themselves to the sides of the crucible in the form of fine cotton.

These flowers are to be separated at times, and by careful management there may be collected from the zink a greater weight of flowers than its own weight, when put into the fire. In working four pounds of zink in this manner, there will be only about an ounce of a calcined earthy matter left at the bottom of the crucible, and the quantity of flowers will be about two drams and a half in each pound, more than the quantity of zink; beside that, it is easy to conceive from the manner of making them, that a great quantity must have been carried away with the smok. And this is not to be prevented, since, if the vessel be closed to keep in the fumes, the external air being denied free access, the sublimation immediately ceases, and no more flowers can be obtained, till the vessel is again opened, and the air admitted.

The fumes of zink have a strong smell of garlic, and are very noxious to the lungs. The reducing zink into these flowers, is the destroying it absolutely as to its metallic form; for none of the methods used by chemists to bring back metals to their original state, are able to bring these flowers to zink again.

ZINZIBER, or ZINGIBER, GINGER, in botany, the naked stalked oval spiked amomum. See the articles **AMOMUM** and **GINGER**.

ZIRICKSEE, a port-town of the United Netherlands, in the province of Zealand, situated on the south side of the island of Schowen, fifteen miles north-east of Middleburg.

ZITTAU, a town of Germany, in the circle of Upper Saxony, and marquissate of Lusatia, situated on the river Nies, fifty-five miles east of Dresden.

ZIZANIA, in botany, a genus of the monoecia-hexandria class of plants; the male corolla whereof is a glume formed of two valves; the female corolla is a glume formed of a single valve, of a cuculated form, and terminated by an arista or awn; there is no calyx in either

the male or female flowers; the seed is single, and placed in the bottom of the corolla, which opens horizontally to let it out.

ZIZIPHORA, the **AMETHYSTEA**, in botany, a genus of the diandria-monogynia class of plants, the corolla whereof is formed of a single ringent petal; the tube is cylindric, and of the length of the cup; the limb is very smooth, the upper lip is ovate, erect, emarginated, and obtuse, the lower lip is broad and patent, and is divided into three equal rounded segments; there is no pericarpium, but the cup contains four seeds which are oblong and obtuse, gibbous on one side, and angular on the other.

ZIZIPHUS, in botany, a name whereby some authors call the rhamnus. See the article **RHAMNUS**.

ZOCCO, **ZOCCOLO**, **ZOCLE**, or **SOCLE**, in architecture, a kind of stand or pedestal, being a low square piece, or member, serving to support a busto, statue, pedestal, or the like thing that needs to be raised. See the article **SOCLE**.

ZODIAC, *zodiacus*, in astronomy, a fascia or broad circle, whose middle is the ecliptic, and its extremes two circles, parallel thereto, at such a distance from it, as to bound or comprehend the excursions of the sun and planets. See the articles **ECLIPTIC**, **EARTH**, **PLANET** and **SUN**.

The sun never deviates from the middle of the zodiac, *i. e.* from the ecliptic, but the planets all do more or less. Their greatest deviations, called latitudes, are the measure of the breadth of the zodiac, which is broader or narrower, as the greatest latitude of the planets is made more or less; accordingly some make it sixteen, some eighteen, and some twenty degrees broad. See **LATITUDE**.

The zodiac, cutting the equator obliquely, makes an angle therewith, of $23^{\circ} 29'$ and a half, or more precisely of $23^{\circ} 29'$, which is what we call the obliquity of the zodiac, and is the sun's greatest declination. See the articles **OBLIQUITY** and **DECLINATION**.

The zodiac is divided into twelve portions, called signs, and those divisions or signs are denominated from the constellations which antiently possessed each part; but the zodiac being immoveable, and the stars having a motion from west to east, those constellations no longer correspond to their proper signs, whence arises what we call the precession of the

equinoxes. See the articles **SIGN**, **CONSTELLATION**, and **PRECESSION**.

When a star therefore is said to be in such a sign of the zodiac, it is not to be understood of that sign or constellation of the firmament, but only of that twelfth part of the zodiac, or dodecatemory thereof. See the articles **STAR** and **DODECATEMORY**.

Cassini has also observed a track in the heavens, within whose bounds most of the comets, though not all of them, are observed to keep, which for this reason he calls the zodiac of the comets. See the article **COMET**.

This he makes as broad as the other zodiac, and marks it with signs and constellations like that, as Antinous, Pegasus, Andromeda, Taurus, Orion, the lesser Dog, Hydra, the Centaur, Scorpion, and Sagittary.

ZOLLERN, or **HOENZOLLERN**, a city of Germany, in the circle of Swabia, capital of the county of Zollern, and subject to its count, situated east long. $8^{\circ} 55'$, north lat. $48^{\circ} 18'$.

ZOLNOCK, a town of Upper Hungary, situated on the river Teyesse, fifty-five miles east of Buda.

ZONA, or **ZONA IGNEA**, the *shingles*, in medicine, a species of herpes. See the article **HERPES**.

ZONE, *zōnē*, in geography and astronomy, a division of the terraqueous globe, with respect to the different degrees of heat found in the different parts thereof. See the articles **EARTH** and **HEAT**.

A zone is the fifth part of the surface of the earth, contained between two parallels. See the article **PARALLEL**.

The zones are denominated torrid, frigid and temperate.

The torrid zone is a fascia, or band surrounding the terraqueous globe, and terminated by the two tropics. Its breadth is $46^{\circ} 58'$. The equator, running thro' the middle of it, divides it into two equal parts, each containing $23^{\circ} 29'$. The antients imagined the torrid zone uninhabitable. See **TROPIC** and **TORRID**.

The temperate zones are two fasciæ, or bands, environing the globe, and contained between the tropics and the polar circles, the breadth of each is $43^{\circ} 2'$. See the article **TEMPERATE**.

The frigid zones are segments of the surface of the earth, terminated, one by the antarctic, and the other by the arctic circle. The breadth of each is $46^{\circ} 58'$. See **ARCTIC** and **ANTARCTIC**.

ZON.

ZONNAR, a kind of belt, or girdle of black leather, which the Christians and Jews of the Levant, particularly those in Asia, and the territories of the grand seignior, are obliged to wear to distinguish them from the mahometans.

ZOOLOGY, *Zoologia*, the science of animals. Artedi observes, that this makes one of the three kingdoms, as they are called, of natural history; the vegetable and the mineral being the two others: in these, however, there is this difference made by writers, that while vegetables and minerals are treated of together, as all of a piece in each, the subjects of zoology are divided; and it is made to compose, as it were, several kingdoms. Whoever is to write on plants and minerals, calls his work a treatise of botany, or mineralogy; and we have no words to express any subdivision of them into kingdoms: but, in zoology, we treat as different subjects, the different parts of it; and the history of birds is separated by some from the rest under the name of ornithology; that of quadrupeds under the name of tetrapodology; and we have for the rest, the words entomology, amphibiology, and the like, expressing these things which are properly but the parts of zoology, as so many distinct and separate studies. See the articles **BOTANY** and **MINERALOGY**.

The same author observes, that this may easily be amended, by our considering the animal world as we do the vegetable and mineral, and dividing it, as we do the others, into its proper families; it will then be found that these are no better distinctions than those of the families of these things, and that the authors may as well set up separate studies under the names of bulbology, umbelliferology, and the like, as those.

A natural division of the subjects of zoology, on this principle, will afford six several families of its subjects. 1. The hairy quadrupeds. 2. The birds. 3. The amphibious animals, such as serpents, lizards, frogs, and tortoises. 4. The fishes. 5. The insects. And sixthly, those lowest order of animated beings the zoophytes. See the articles **QUADRUPED**, **BIRD**, **FISH**, **ORNITHOLOGY**, **ICHTHYOLOGY**, &c.

ZOOPHORIC, or **ZOOPHORIC COLUMN**, is a statuary column, or a column that bears and supports the figure of an animal. See the article **COLUMN**.

ZOOPHORUS, or **ZOPHORUS**, in the

antient architecture, the same thing with frieze in the modern. See **FRIEZE**.

ZOOPHYTON, or **ZOOPHITE**, in natural history, a kind of intermediate body, partaking both of the nature of a sensitive, and a vegetable. See the article **SENSITIVE Plant**.

ZOOTOMY, the art of dissecting animals, or living creatures, being the same with anatomy, or rather comparative anatomy. See the articles **DISSECTION** and **ANATOMY**.

ZOPISSA, *naval pitch*, a kind of mixture of pitch and tar, scraped off ships that have been a long time at sea.

This matter by being gradually penetrated by the salt of the sea, becomes partaker of its qualities, and being applied to the body externally, is found to be resolute and desiccative.

ZUG, one of the cantons of Switzerland, is surrounded by the cantons of Lucern, Zurich and Switz, and is eighteen miles long, and seven broad.

ZUINGLIANS, a branch of the antient christian reformers, or protestants, so called, from their author Huldric Zuinglius, a divine of Switzerland, who soon after Luther had declared against the church of Rome; and being then minister of the church at Zurich, fell in with him, and preached openly against indulgences, the mass, the celibacy of the clergy, &c. What he differed from Luther in, concerned the eucharist: for interpreting *hoc est corpus meum*, by *hoc significat corpus meum*, he maintained, that the bread and wine were only significations of the body and blood of Jesus Christ; whereas Luther held a consubstantiation. As to the matter of grace, Zuinglius seemed inclined to Pelagianism, in which he differed from Calvin.

ZURICH, a canton of Switzerland, bounded by the canton of Schaffhausen, on the north; by the canton of Appenzel on the east; by Zug and Switz on the south; and by Bern and Lucern on the west, being fifty miles long, and forty broad. Zurich is also the name of the capital city of this canton, situated east long. 8° 30', and north lat. 47° 52'. It is likewise the name of a lake, twenty-four miles long, and three broad; at the south end of which the city of Zurich stands.

ZUTPHEN, a city of a county of the same name, in Gelderland, situated on the river Yssel, sixteen miles north-east of Arnheim: east long. 6°, north lat. 52° 15'.

ZUYDER-

ZUYDERSEE, a great bay of the German Ocean, which lies in the middle of the United Provinces, having the islands of Texel, Flie, and Schelling, at the entrance of it, on the north; the provinces of Friesland, Overysfel and Gelderland on the east; Utrecht, and part of Holland on the south; and another part of Holland on the west. The chief town is Amsterdam.

ZWEIBRUGGEN, a county of the palatinate of the Rhine, in Germany, subject to the duke of Deuxpouts.

ZWICKOW, a town of the circle of Upper Saxony, and territory of Voightland, situated on the river Muldaw, forty-six miles south-west of Dresden.

ZWINGENBURG, or SWINGENBURG, a town of Germany, in the circle of the Upper Rhine, and land of Hesse Darmstadt, twelve miles north-east of Worms.

ZYGÆNA, or BALLANCE-FISH, in ichthyology, a species of squalus, with a very broad transverse hammer-like head. See the article **SQUALUS**.

This is one of the most extraordinary fish in the world; in its form the general size is five or six feet, but it grows to be much larger; the head is the most extraordinary figure of that of any fish. It is not oblong, and running in a line with that of the body, but is placed transversely, and has the appearance of the head of a hammer fastened to its handle; the eyes are large, and placed at the two extremities; the mouth is transverse cut on the lower part of the head, and furnished with three or four rows of sharp teeth; the nostrils are small and not very conspicuous, and the foramina at the eyes are oblong and large; the body is oblong and moderately thick; there are two back fins, and a pinna ani; the apertures of the gills are ten oblong slits, five on each side, running from just below the head towards the roots of the pectoral fins: the tail is divided into two parts, and the upper of these is much longer than the under. See plate CCCII. fig. 5.

ZYGOMA, in anatomy, a bone of the head, otherwise called os jugale, being no single bone, but an union or assemblage

of two processes, or eminences of bones; the one from the os temporis, the other from the os maxæ; these processes are hence termed the zygomatic processes; and the suture that joins them together, is denominated the zygomatic suture. See **PETROSA** and **SUTURE**.

ZYGOMATICUS, in anatomy, a muscle of the head, arising from the os zygoma, whence its name, and terminating at the angle of the lips. This muscle, though usually single, is sometimes double throughout; at other times it has a double head; sometimes its tail only is bifid, and it is variously interwoven with the adjoining ones. See the preceding article.

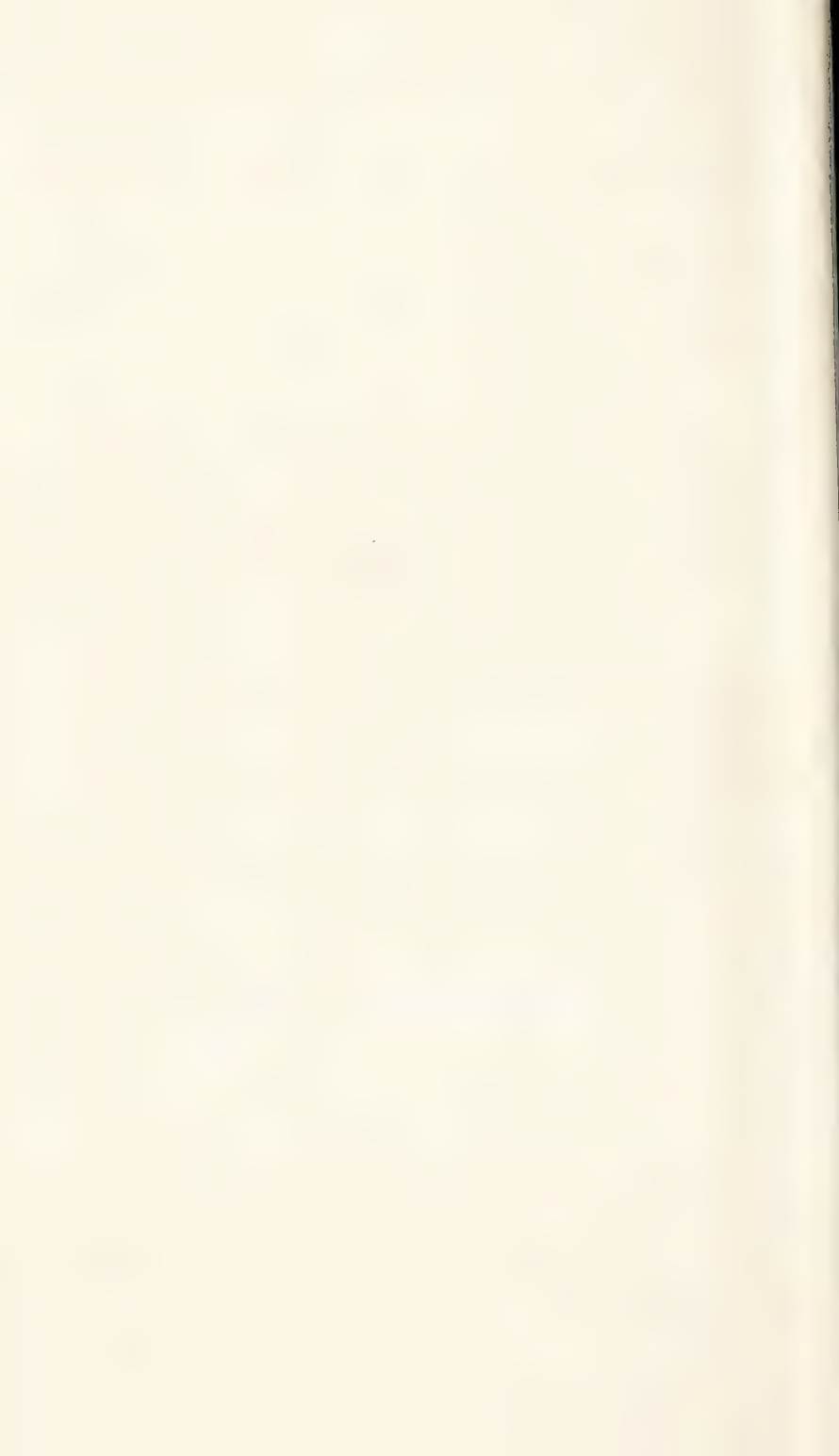
ZYGOPHYLLUM, *bean-capers*, in botany, a genus of the decandria-monogynia class of plants, the corolla whereof is composed of five petals broadest at the top; obtuse, emarginated and larger than the cup; the nectarium consists of ten convergent leaves, and includes the germen; the fruit is an oval pentagonal capsule, formed of five valves, containing five cells, with septa adhering to the valves; the seeds are numerous, roundish, and compressed; the figure of the fruit is subject to variation, and there is a species in which the parts of fructification are a fifth less. This genus comprehends the fabago of Tournefort.

ZYMOLOGY, in chemistry, is a term used by some writers, to express a treatise on fermentation, or the doctrine of fermentation in general. And,

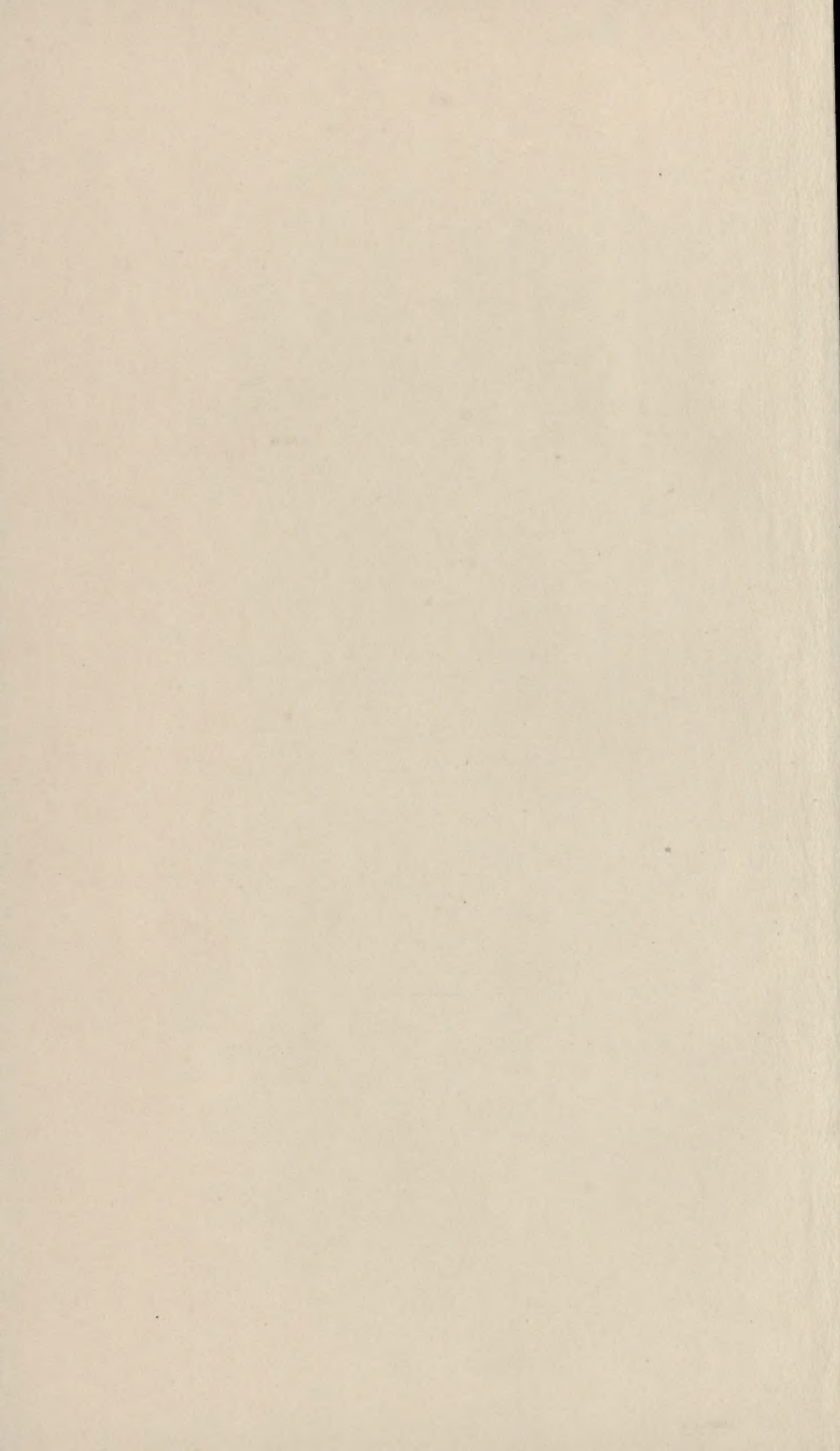
ZYMOSIMETER is an instrument proposed by Swammerdam, wherewith to measure the degree of fermentation occasioned by the mixture of different matters, and the degree of heat which those matters acquire in fermenting; as also the heat or temperament of the blood of animals. See the articles **FERMENTATION**, **HEAT**, &c.

ZYTHOGALA, *beer posset*, a drink recommended by Sydenham, as good to be taken after a vomit, for allaying the acrimonious and disagreeable taste the vomit has occasioned, as well as to prevent gripes.









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